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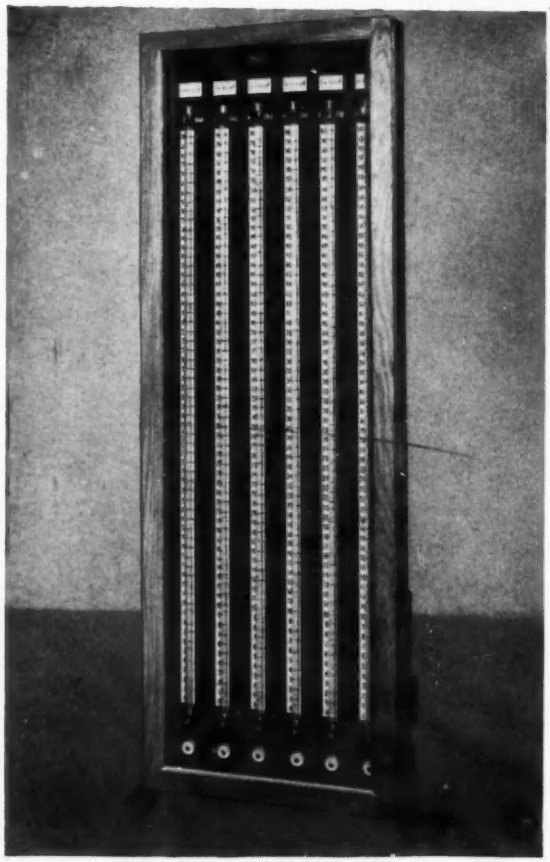

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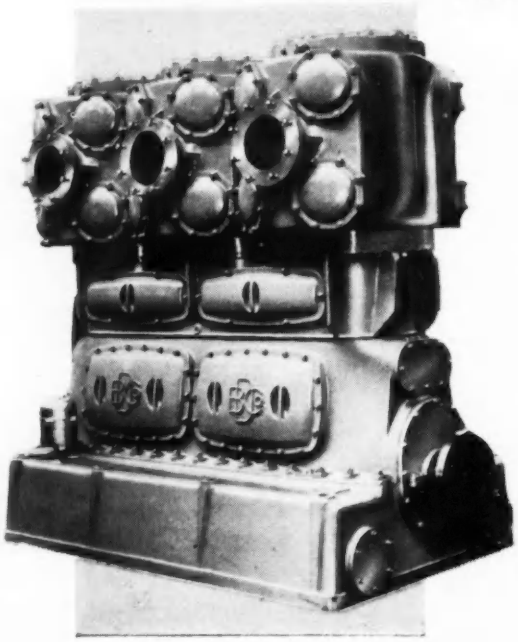

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WEDNESDAY, MARCH 8, 1961

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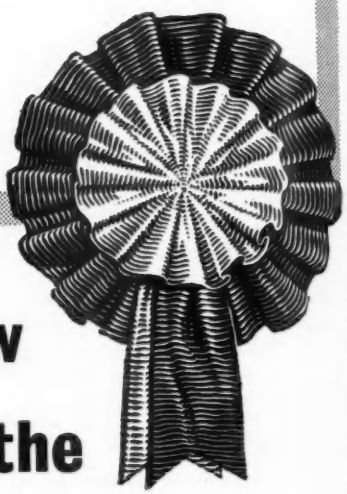

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Gas Journal

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Golden Jubilee for industrial gas

NEXT Tuesday, at a lunch to be held in Sutton Coldfield, Sir Henry Jones, the Chairman of the Gas Council, and the industrial top brass in the British gas industry, will combine with a large number of eminent industrialists to congratulate the West Midlands Gas Board on 50 years of service to industry.

Obviously such an occasion invites historical flashbacks and a wealth of reminiscence. On a later page will be found an account of the evolution and growth of this service, which has achieved a size and a reputation which must surely make it the envy of any other organisation providing fuel for industry. It will be seen that its development has been both natural and logical, unimpaired by changes of ownership and administrative reshuffles. The industrial department took nationalisation in its stride, and the changes which have been made since appear as the natural consequences of healthy growth rather than the result of an iron-fisted administration. Memories in the department are long, and there exists a keen sense of tradition, but it is coupled with an enthusiasm and a determined ambition which are essentially youthful.

Indeed, a visit to the department is a singularly encouraging experience. The heat treatment centre at Adderley Street, Birmingham, must be one of the finest in the country. Not only is it invaluable for training and demonstration, but its main purpose is experimentation and the actual processing of a wide variety of components—this last an activity which makes this centre and the one at Coventry rather more than self supporting.

The heat treatment centre was formerly at Brasshouse Passage, Birmingham, which now houses the centralised design, development and technical advice service. (This too may be moved to Adderley Street one day, where there is an extensive site and where good architectural use could be made of the old holder tanks.)

Apart from serving as a clearing house for information over the whole field of industrial gas usage, this nerve centre of the organisation has three distinct but related functions. In the first place it provides assistance in answer to a direct appeal from a divisional industrial gas officer for advice on a particular project; this may entail a works survey, the testing of apparatus, increasing the efficiency of existing plant, or designing equipment to meet the manufacturer's individual requirement. Secondly, it permits consultation with manufacturers of gas equipment who can be helped in a variety of ways—even to the extent of completely redesigning apparatus to modern standards. And thirdly, the department will undertake investigation into the requirements of a particular industry, in which case the work is undertaken for the industry as a whole and any developments having commercial value are passed on to recognised plant manufacturers. Instances of this type of development are the multi-passage kiln for pottery firing, now in commercial use by a number of manufacturers, and a bale-out metal melting pot designed to provide quieter and more comfortable conditions for the operator; the latter is now undergoing final tests in the laboratory.

The last ten years have seen a sudden intensification of competition in the industrial fuel field. Both oil and l.p.g. have developed loads with surprising speed. Today it is increasingly difficult for town gas to compete on price—which is perhaps not surprising when one considers that the refineries have no alternative but to get rid of their products somehow! What is really remarkable is that although town gas has lost a certain amount of business to oil and l.p.g., this competition has not been successful in halting the upward curve of industrial gas sales. In the West Midlands area, for example, the industrial load has increased by 66% in the past ten years—9½% in the last year alone—and a further substantial rise may be expected when the current year's figures are released. In some instances gas is competing successfully although as much as twice the price of its competitor—an astonishing tribute to the service offered by the Board. For in many cases it is this alone which is encouraging the consumer to favour gas: Instant attention, good personal relations, know-how based on long experience, and extensive development facilities—these are the qualities which are maintaining gas as an expanding competitor in the industrial fuel scene.

Looking ahead there may be difficulties. Obviously much will depend on the Board's ability to hold gas prices, but there is another problem, smaller in scale, but equally vital. It is the growing difficulty of obtaining—and retaining—first-class engineers able to continue and extend the load as it is capable of being extended. The West Midlands, like the other gas boards, is competing in a personnel market in which supply consistently fails to keep pace with demand. It is true that the Board has been successful in obtaining

some excellent people—the tremendous scope of the area and the facilities it offers may give it a certain edge over some of the other areas in this respect—but there seems to be no way of stopping the draining away of engineers to N.I.F.E.S. and other organisations. (Of course, there *is* a way but it involves finance, and that raises another whole string of problems!) There are certain consolations, however: These men lost to the Board but trained by them and given their experience by them, are fully alive to the advantages gas has to offer; in this sense they may be regarded as ambassadors, even messiahs.

Despite this shortage of trained manpower the industrial department is clearly ready, willing and able to add many more chapters to its success story. Several names could be mentioned as contributing to the triumphs of the past, among them Dr. C. M. Walte, Sir Ernest Smith and Mr. H. R. Hems. And we must not forget the benign influence of the present Board Chairman, Mr. G. le B. Diamond, who has done much to bring the department to its present degree of excellence. Of the many assets Mr. C. H. Leach will take over in a few months' time, the industrial department must be regarded as one of the plums.

A programme completed?

WITH the commissioning of the new plant at Garston, near Liverpool, an account of which we are publishing this week, the main gas production programme set out by the North Western Gas Board at the time of nationalisation in 1949 may be said to have been completed. This was to concentrate production in a limited number of works, at a few of which, specially chosen for their strategic position both for the supply of suitable coal and for their proximity to centres of high gas consumption, were to be built the most modern carbonising plants equipped with the latest practice in heat recovery, power production, mechanical handling and coke grading.

These specially selected gasworks were Higginshaw, near Oldham; Denton, outside Manchester; Lostock Hall, near Preston; White Lund, between Lancaster and Morecambe; and Garston, adjoining Liverpool. A study of the map of the North Western Board's area and an acquaintance with the general industrial activity in Lancashire will show the importance of these key works, all of which, except Higginshaw, we have described in some detail in the 'GAS JOURNAL' as they have been commissioned.

Apart from enabling us to keep fully up to date with trends in carbonising techniques since the war, the inspection of each new works as it was completed has shown the direction in which the general layout of gasworks has proceeded since nationalisation, the stress laid on reducing labour and increasing heat availability, and, perhaps of greater importance than it might appear at first sight, the growing attention being given to conditions of work at all levels—welfare services in the form of the works' canteens, proper washing facilities and clothes' lockers.

Of the works referred to, White Lund was built on a 'green field' site and while there was a small works at Denton, later demolished, the extension of this gasworks to an area some ten times that of the original site, may also be said to have been laid out on a virgin site. The other three works were extensions to existing plants; in each case the original plant continued to make an important contribution to the combined output of gas. It is notable, however, that of the 'superworks' only two have received the 'full treatment' for power production, though in every case the maximum amount of waste heat steam is raised. These two outstanding works are Denton and Garston, where all waste heat steam is utilised to generate electric power, which is used on the works with the exclusion as far as possible of steam as a prime mover. At Denton, with an output of 4,000 mill. cu.ft. per year, power surplus to requirements may be exported to the grid system, while at Garston, though two electric feeders connect the main switchboard to the national grid, no electricity is exported; the grid merely acts as a standby source of power.

There can be little doubt that the joining of a 'superworks' plant to an existing works still by no means obsolete, but in future to take second place in importance, is a task of some difficulty. That this should have been successfully undertaken at Garston during a protracted period of steel shortage and delay caused by the Board having to slow down its modernisation programme by circumstances outside its control, speaks very highly for the engineers of the then Liverpool Group, in whose hands full day-to-day responsibility for the Garston project lay.

The local Group production department was also largely responsible for the initiative in making the best use of the available site, and overcoming many of the difficulties inherent in the placing of so large a plant—the new plant has a capacity of 14 mill. cu.ft. per day—on an existing site in a crowded working class industrial area. The proximity of Speke airport made particular care necessary in planning, and was responsible for transferring the final planning permission from the Ministry of Town and Country Planning to the Ministry of Civil Aviation. The latter authority insisted on a complete change in the proposed position of the new carbonising building, which affected the layout of the coal and coke handling plants and the relative position of new ancillary plant to the existing exhausters and boosting plant.

If Denton was one of the earlier all-electric gasworks, what developments in gasworks construction and practice are noticeable at Garston which might strike even the most casual visitor?

Undoubtedly the first thing that comes to mind is the chamber house—the gas-making plant at Garston consists of intermittent vertical chambers while that at Denton is a continuous vertical retort plant. The Garston chamber house is constructed entirely of reinforced concrete with a shell roof, divided into two halves by

the mechanical producer plant housed in a central section with a flat roof. In the chamber house proper there are no internal supports to the roof, which enables the plant inside it to be constructed completely independently of it. This had the advantage of easing the planning stages of construction and at the same time saving a good deal of time once work on installation had begun.

This particular form of construction has made possible a streamlined, functional design which has been of some value in the very limited ground space available. The 'fore' part, or that side of the chamber house facing outside the works' gates, has been designed to contain the new welfare section of the new extensions. Here again modern constructional techniques have made possible extremely spacious accommodation which includes locker rooms, messrooms for the shiftmen, canteens, waste heat boiler rooms, and the turbo alternator and switch control rooms.

Though some may feel that this particular design may lack the architectural merit of the chamber house at White Lund, for instance, we feel that the care with which the interior has been laid out and the obvious efficiency with which it carries out its job more than makes up for this. Perhaps the most striking advantage of this form of construction is the very large area of windows it makes possible.

Of the technical advances in actual gas-making, these may be only marginal. The extended use of instrumentation allows a very exact control over producer gas quality to be maintained and so the uniformity of retort heating and temperatures can be kept within fine limits. The flexibility of this type of plant is particularly useful in times of varying gas demand, but on any thermally integrated system this may well cause difficulties over waste heat steam availability.

It is on this particular point and in the solution of this most important problem that the new plant at Garston is unique. Normally if steam is needed to supplement waste heat steam, some form of solid fuel-fired boiler is required, fired by coke or breeze and often kept under a slow fire. At Garston this contingency is covered by providing two oil-fired boilers of extremely flexible output. By linking the burner controls to the steam pressure in the works steam mains, these boilers will supply steam as needed to maintain this pressure at its predetermined value of 325 p.s.i.g.—the highest steam pressure in any gasworks in Britain. The cost of steam raised by this means is considerably higher than by waste heat boilers so that a balance must be struck between the raising of extra quantities of steam at periods of heavy demand for electricity from the works generating plant and importing power directly from the grid.

There can be little doubt that considerable thought has been given to the planning both of the details of economic gas-making and also to the most suitable layout of all materials handling equipment. The fact that an existing c.v.r. plant carbonises a completely different type of coal from the new i.v.c.o. plant made the most exacting planning of the railway sidings' layout essential. Added to this, all tipping has to be done at a common tippler and much of the coal conveyor plant is used by both retort houses. The need to confine tipping to an eight-hour day, five days a week, meant that wagons, marshalled in the right order of coal types, must be handled quickly and the empties disposed of. Clearly it was convenient to fill them with coke to avoid a great deal of unnecessary shunting, and this has been done by an extensive coke handling plant embracing five tracks into which empty wagons pass after tipping.

Is the Garston plant the ultimate in coal carbonising techniques as applied to the gas industry? It may very well be so, because we understand that no more carbonising plants are to be built in the future.

This may cause a sigh of regret among the diehards, but newer processes for gas production from coal are clearly in the air, and in due course these with their very large outputs will supersede the good, well-tried coal gas processes which have served the industry so well.

It is, however, heartening to recall the very great advances made by the industry in the construction and economic management of its carbonising plants since the end of the second world war. This progress will not, we are certain, be thrown away as techniques change and an old craft industry reaches its full manhood and passes into the realms of modern scientific process control.

We dig gas

EVERYONE seems to be agreed that in order to promote gas today it is necessary to hitch the industry's wagon to a topical, fashionable star, to seek a link with the younger generation (including teenagers who are still years short of marriage) and to strive for a fresh style of presentation. The Gas Council has done just that with their stand at the Ideal Home Exhibition this year. In the past we have sometimes felt that there was a certain paucity of new thinking about this important piece of display, but a visit to Olympia (before April 3) will, we think, show that the Council, far from staying in a rut, has really got into the groove.

The theme is Mr. Therm's Top Ten, and the whole stand links gas appliances with pop records, complete with photographic 'blow-ups' of recording stars, and, we understand, occasional visits by certain of these curious products of the contemporary musical scene. The design of the stand is colourful, open and full of pleasant little touches of humour. It is all very refreshing, and suggests that Mr. Therm, far from being a square, is really with it!

Elsewhere in the gas section there is much of interest and a heartening crop of new appliances. It is significant how this exhibition reminds us that, despite the tremendous upsurge of interest in building the space heating load, our bread and butter line is still the cooker. Among the cookers are at least two barely out of the egg—the Flavel Equerry and the New World 44—but there are several others making their first appearance at this show.

We shall be describing the new appliances in the 'GAS JOURNAL,' but may we also draw readers' attention to the fact that the March issue of '*Gas Service*,' publication of which has been delayed so as to permit the inclusion of an Ideal Home Supplement, will give a full-scale illustrated review of this important exhibition.

COAL HANDLING PLANT FOR N.W. GAS BOARD, GARSTON

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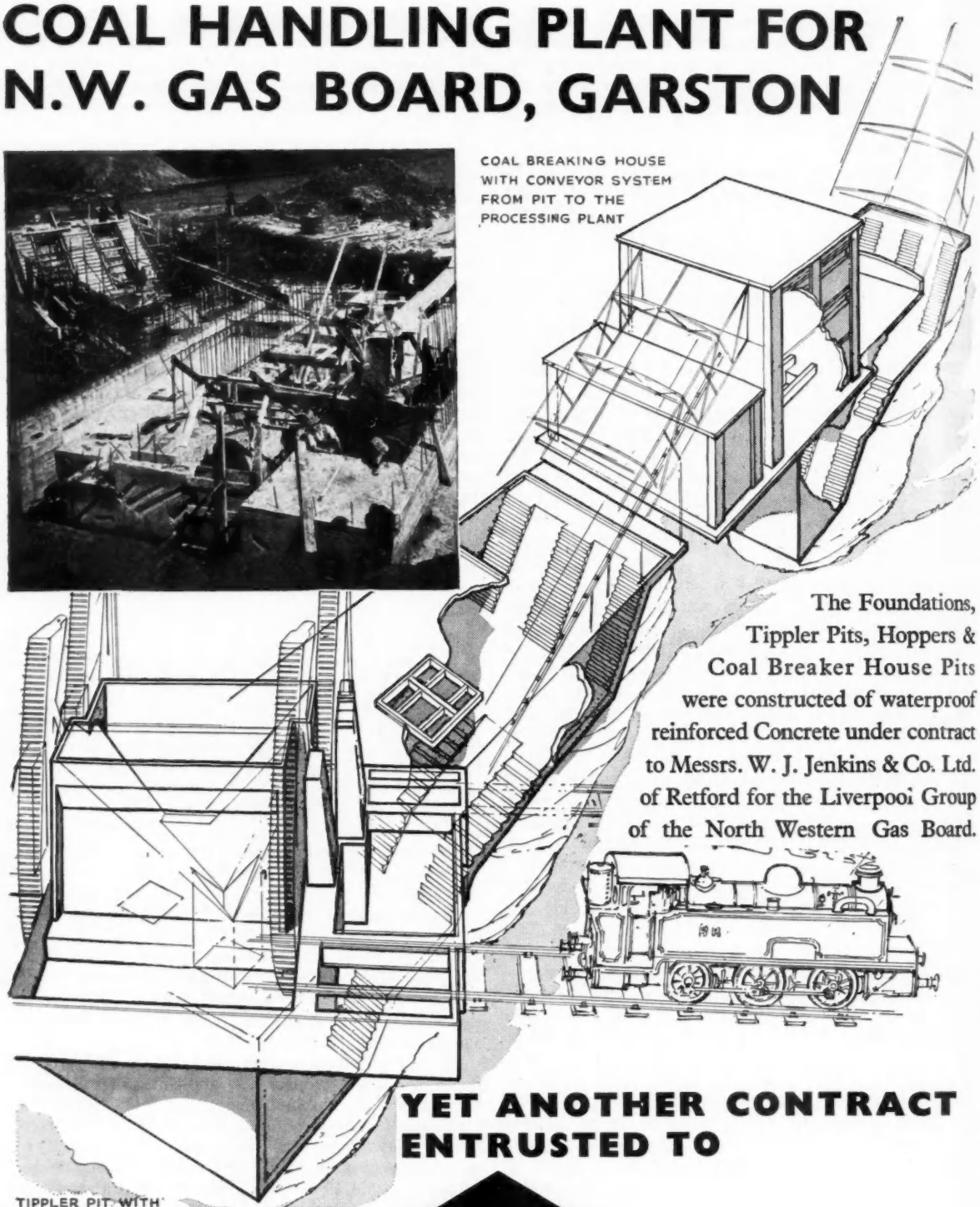

The Foundations, Tippler Pits, Hoppers & Coal Breaker House Pits were constructed of waterproof reinforced Concrete under contract to Messrs. W. J. Jenkins & Co. Ltd. of Retford for the Liverpool Group of the North Western Gas Board.

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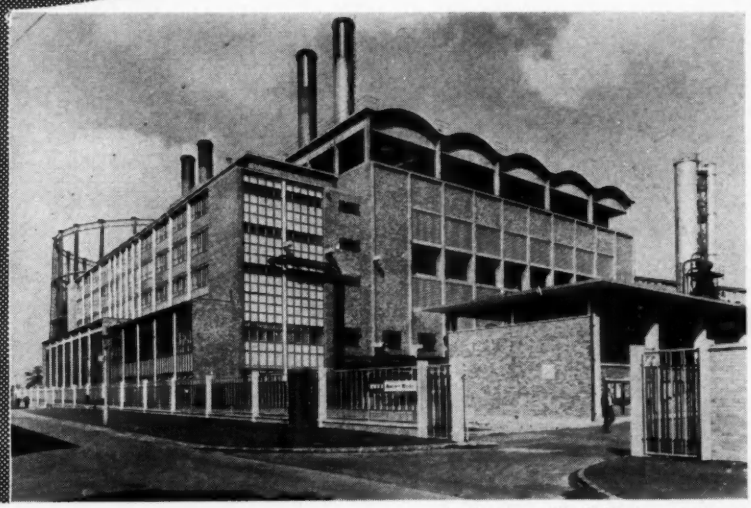

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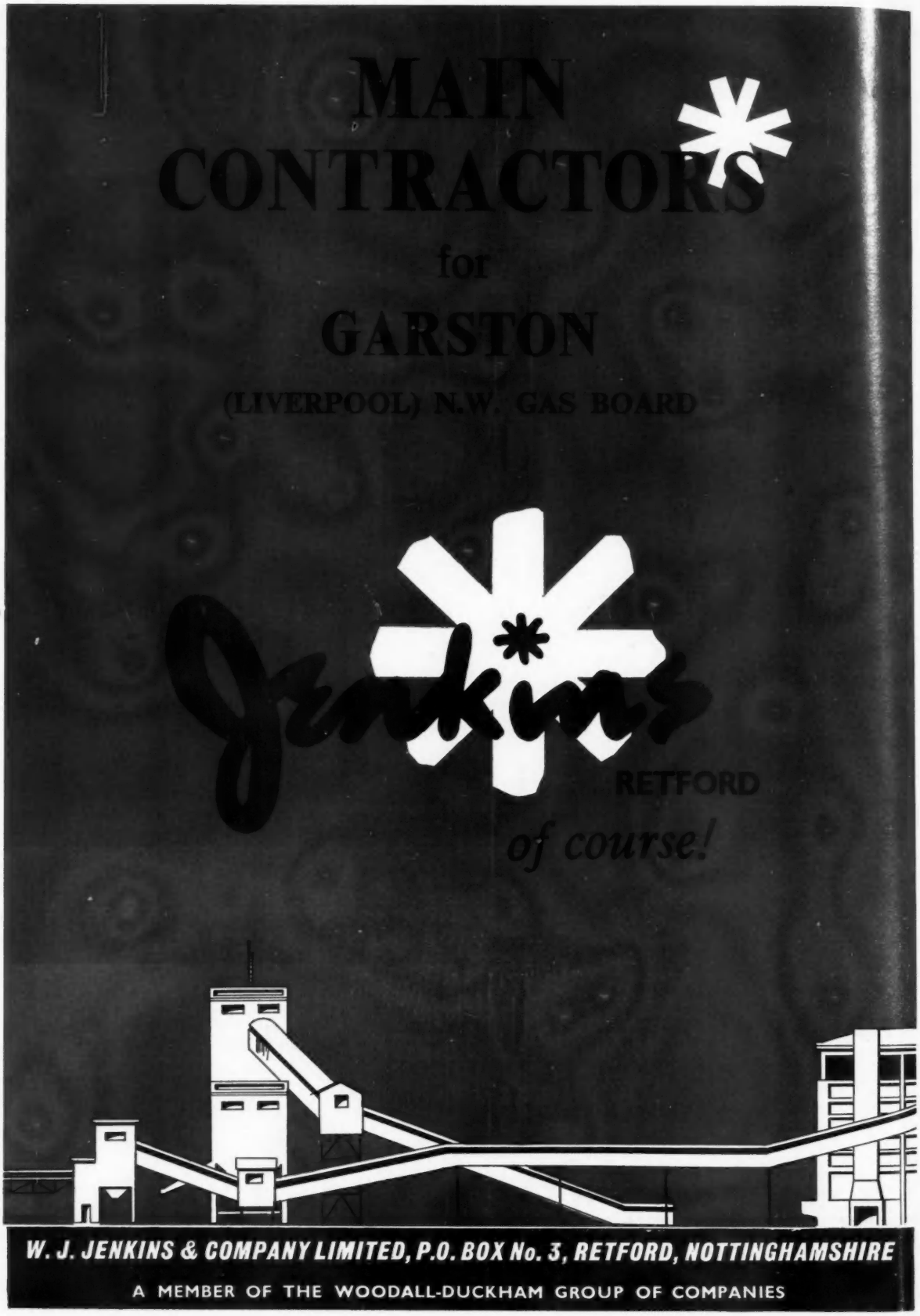
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GARSTON

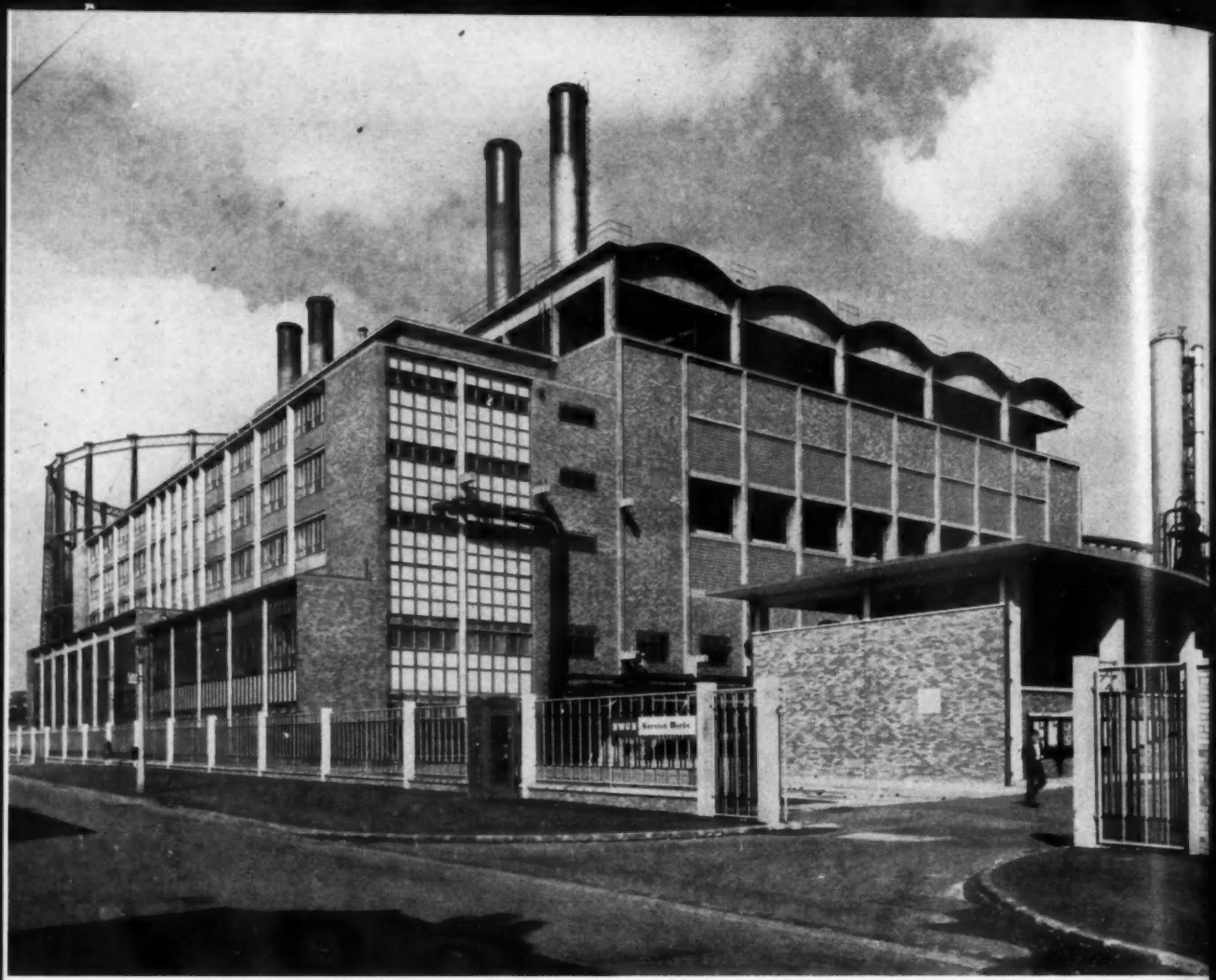
THE new carbonising plant built at Garston, in the Liverpool Group of the North Western Gas Board, has added 14 mill. cu.ft. of coal gas a day to the potential output. The Garston works has the distinction of having been originally constructed for the production of water gas only, there being at the time no carbonising plant on the site, and when laid out in the early 90's of the last century, it contained one of the three earliest plants built by Humphreys & Glasgow Ltd. in Great Britain. In later years carbonising plants were added and latterly, in addition to three carburetted water gas plants of a total capacity of 8 mill. cu.ft. a day, there were a c.v.r. plant of 4 mill. cu.ft. a day and a horizontal plant of $2\frac{1}{2}$ mill. cu.ft. a day. At the present time the horizontal plant has been demolished and the new plant represents additional coal gas production capacity. Even before nationalisation the Liverpool Gas Company had decided to build additional carbonising plant to meet increasing loads and to replace obsolete plants. It was only at Garston that there was enough room to build the 10 mill. cu.ft. per day plant then proposed. After nationalisation and the formation of the Liverpool Group, additional gas-making capacity was still needed by the North Western Gas Board and it was decided to go ahead with the Garston project but, with the increasing loads, the capacity of the new plant was raised to 14 mill. cu.ft. a day. In spite of the advantages offered by a c.v.r. plant an i.v.c.o. plant was chosen because of its increased flexibility and its ability to carbonise small coals successfully, an advantage over the continuous system, which needs a washed sized coal for trouble-free operation.

LIVERPOOL'S NEW THERMALLY INTEGRATED GAS-MAKING PLANT

THE proximity of the Garston works to Speke airport meant that the plans for the new project, submitted to the Ministry of Town and Country Planning for its approval, were passed to the Ministry of Civil Aviation.

In the original layout, the new plant was to be built on the south side of the works, next to the existing continuous plant, but this proposal was quite unacceptable to the Ministry of Civil Aviation, and it became clear that any new buildings must be 'screened' from the airport by existing buildings.

With this in mind, new plans were submitted showing the new plant placed near an existing gasholder at the works boundary adjacent to Banks Road at the main entrance. This arrangement was accepted by the planning authorities and the Ministry of Civil Avia-



The main entrance to the Garston works of the North Western Gas Board, showing intermittent vertical retort house, the booster house, boiler house, canteen and ablutions.

tion, but since it was so near to domestic property, a consultant on the Right of Light was called in.

His report showed that this property would not be overshadowed by the new plant, but in order that all those living in the vicinity should be fully informed, they were invited to inspect a model of the new chamber house and the drawings of the scheme.

Those concerned with the design of the new plant faced certain problems connected with the handling of full and empty wagons to and from the coal tipplers and the full coal wagons waiting to be marshalled and shunted on to the main line for despatch by British Railways.

The two separate and distinct carbonising plants need coal of different qualities in differing quantities. The 14 mill. cu.ft. a day i.v.c.o. plant will carbonise 1,000 tons of coal a day and the 4 mill. cu.ft. a day c.v.r. plant, 250 tons a day.

How coal is handled after tipping

The capacity of the handling plant to meet these conditions was designed to deal with 1,750 tons of mixed i.v.c.o. and c.v.r. coal in an eight-hour day. Based on a 10-ton wagon, this meant that each section of the sidings must be laid out to accommodate 175 wagons at any one time, though the possibility of the increasing use of larger capacity wagons was kept in mind.

The handling of the coal after tipping is by belt conveyor, a large proportion of which is common to both the i.v.c.o. and the c.v.r. plants. To prevent a mixing of the two qualities, therefore, they must be tipped separately.

In actual practice the i.v.c.o. coal is tipped first, any wagon of c.v.r. coal appearing in the train being allowed to run through. In due course, the belt conveyor system is cleared of coal and the c.v.r. coal remarshalled for subsequent tipping.

To meet the demands of British Railways to have access to the Garston sidings for 22 hours out of every 24, the coal reception sidings must have a capacity of a full day's tipping and an equal standage capacity has been allowed in the tippler sidings and the coke storage sidings, the rest of the major part of the track being used for coke loading.

To solve these problems, a model was made of the railway tracks and experiments were carried out with actual wagon movement. Between 6 a.m. and 8 a.m., the

Board's locomotive moves the day's quota of full wagons from the reception siding to the three tracks leading to the tipplers.

Two winch-operated beetles, each capable of handling 12 wagons, draw the wagons on to the tippler table. As they are unloaded they are pushed clear by the next full wagon and gravitate to the coke loading sidings.

Any c.v.r. coal wagons passing through are temporarily stored on an adjacent siding. The design and layout of the railway siding was carried out by Thomas Summerson & Sons Ltd., of Darlington.

The points on the track between the tippler and the coke loading section are electro-pneumatically operated from an elevated cabin built near the tipplers, from which the operator has an unrestricted view of that part of the sidings.

Helped by a mimic diagram, he can direct traffic to suitable coke loading points, as well as being responsible for the weighing of full and empty wagons. He is in touch by telephone with British Railways' signalling control points as well as other parts of the works.

When the positions of the major pieces of plant had been decided, a survey of the site was carried out by a specialist on soil mechanics.

What the survey of the site showed

About 40 boreholes and trial pits showed a stratum of hard sandstone at a depth varying between 5 ft. and 25 ft. Above this was a layer of weathered sandstone, which under wet conditions is identical with consolidated sand, but on drying hardens considerably.

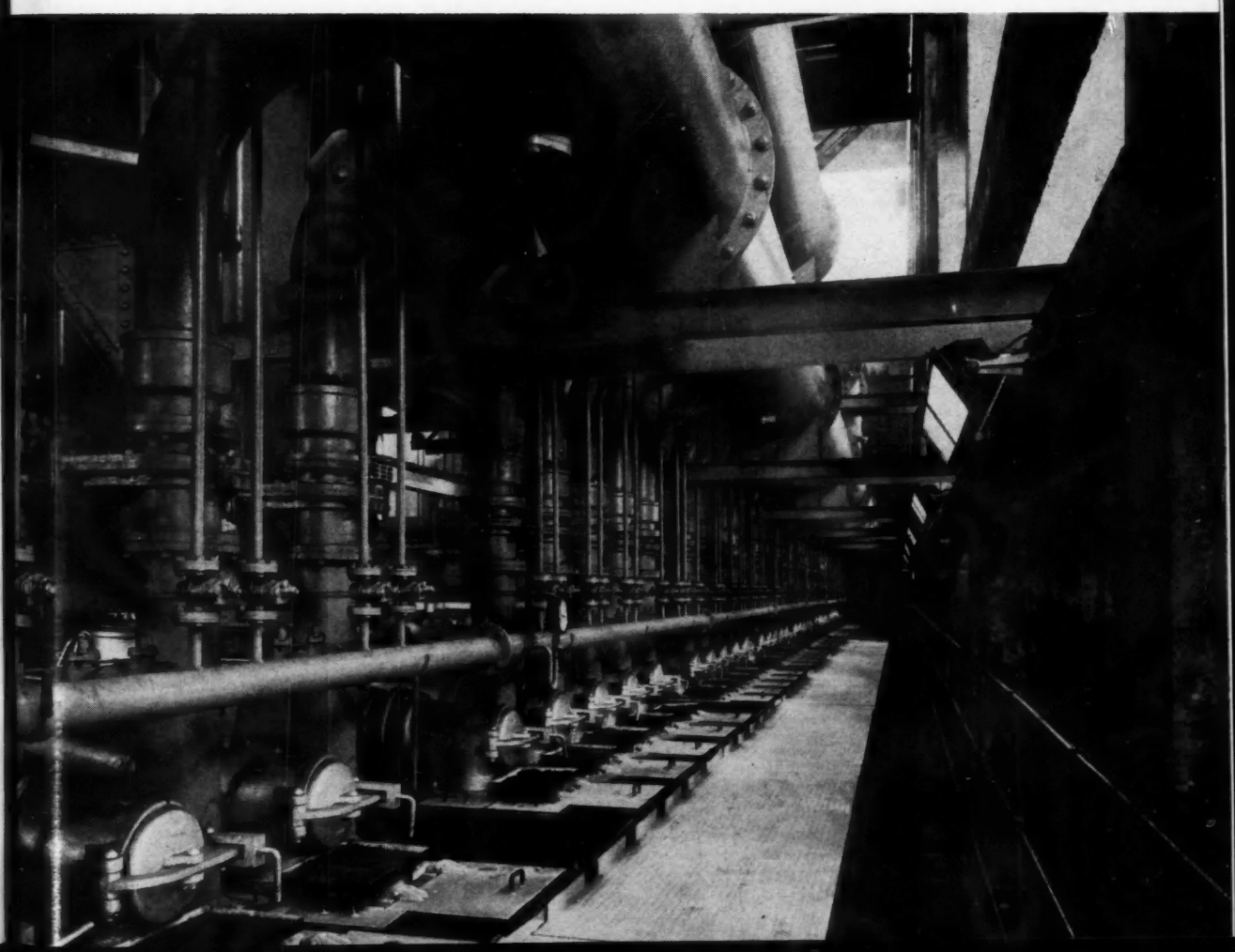
Above this weathered sandstone is to be found a stiff brown clay, and in some cases a marley clay containing seams of sand. The surveyor's report indicated safe bearing loads of 4 tons a sq.ft. for the hard sandstone and 1 to 2 tons a sq.ft. for the stiff clay.

The absence of water showed that it was unlikely that there would be any trouble during the excavation of pits up to 25 ft. deep. This proved to be the case.

For the heavier foundations—those required for the chamber house buildings, the coke storage bunkers and parts of the handling plant structure—it was necessary to go down to the hard sandstone.

For lighter loads mass foundations were laid on the hard clay, but to support the foundation slab for the tray purifiers, short pre-cast reinforced concrete piles up

Inside the chamber house at charging floor level, showing the top gas off-takes and the individual liquor-sealed connections to the foul main.



The interior of the alternator room, with the control room on the right, gives an indication of the modern layout of the fore-part of the chamber house.

to 15 ft. long had to be driven. Where a set could be obtained at 10 ft. the heads were cut off and the reinforcement spliced into the steel for the ground level slab.

The design of the foundations for the tar and liquor tanks, though new to the Liverpool Group, has been standard practice in the oil industry for many years. It consists of hand-placed hard core, well consolidated, and a 10-in. layer of dry sand laid in falls and rolled, in this case, by a 10-ton roller.

The centre of the foundation is some 3 in. higher than the periphery and a 2 in. thickness of bitumenised stone laid on the sand completes the slab. This type of construction has the merit of being cheaper than reinforced concrete and the topping being compressible allows an even bedding down of the bottom tank plates under load which ensures equal stresses in the plate joints.

Coal is unloaded by two Strachan and Henshaw Rotoside tipplers with a capacity of 30 wagons per hour, which can accommodate wagons up to 25 tons net weight.

An Avery dead and live rail weighbridge of 40 tons capacity is incorporated which enables the gross and tare weights to be recorded automatically.

Coal withdrawal from tippler hopper

The empty wagon gravitates to the coke loading sidings down an incline of 1 in 75, and experiments have enabled its speed to be controlled to prevent damage by collision. Hydraulically controlled rocking devices fitted between the tracks as retarders have been tried, but the very variable operating conditions make it a difficult problem to solve.

Coal is withdrawn from the concrete tippler hopper by Sherwin electro-magnetic vibrator feeds to twin 42-in. belts with a capacity of 300 tons per hour on which magnetic tramp iron separators have been provided. A mimic diagram of the conveyor system enables the plant operator to route the coal as needed. Sequence starting allows a central switch control system.

Fluid drives on all conveyor motors have been installed, and minimum speed motor cut-off devices and trip wire emergency stops have been provided. Switchgear has been supplied by Brookhirst Switchgear Ltd.

In the crusher house, built by Norwest Construction Co. Ltd., two 150-ton per hour British-Jeffrey-Diamond crushers—they may be by-passed—reduce large coal to 2-in. cubes. Pegson screens permit selective crushing.

Coal may now be taken, (1) to the c.v.r. retort house by an 80-ton per hour single-belt conveyor, (2) to the i.v.c.o. chamber house by a 300-ton per hour 36-in. belt system via a transfer tower, (3) to a 700-ton storage bunker by a 36-in. reversible shuttle band conveyor capable of filling any of the five bunkers into which it

is sub-divided, or (4) to an outside stocking area.

The 700-ton bunker provides additional coal storage at the weekend for the c.v.r. plant or standby facilities for the single conveyors to either carbonising plant. Coal is loaded into road vehicles from this bunker and delivered to the appropriate conveyor for supplying the carbonising plants.

On arrival at the chamber house the conveyor-borne coal is distributed to the service bunkers above the benches by roof conveyors. An emergency conveyor, designated No. 43, is used to bring in coal or coke brought by road vehicle and can supply it to any appropriate storage bunker.

The chamber house bunkers hold enough coal for 66 hours running on each bench at full throughput. There is also at the end of each bench a pad coke bunker capable of holding 70 tons of suitably graded coke.

Any grade can be brought in from the coke grading plant both for this purpose and for retort filling at the rate of 300 tons per hour.

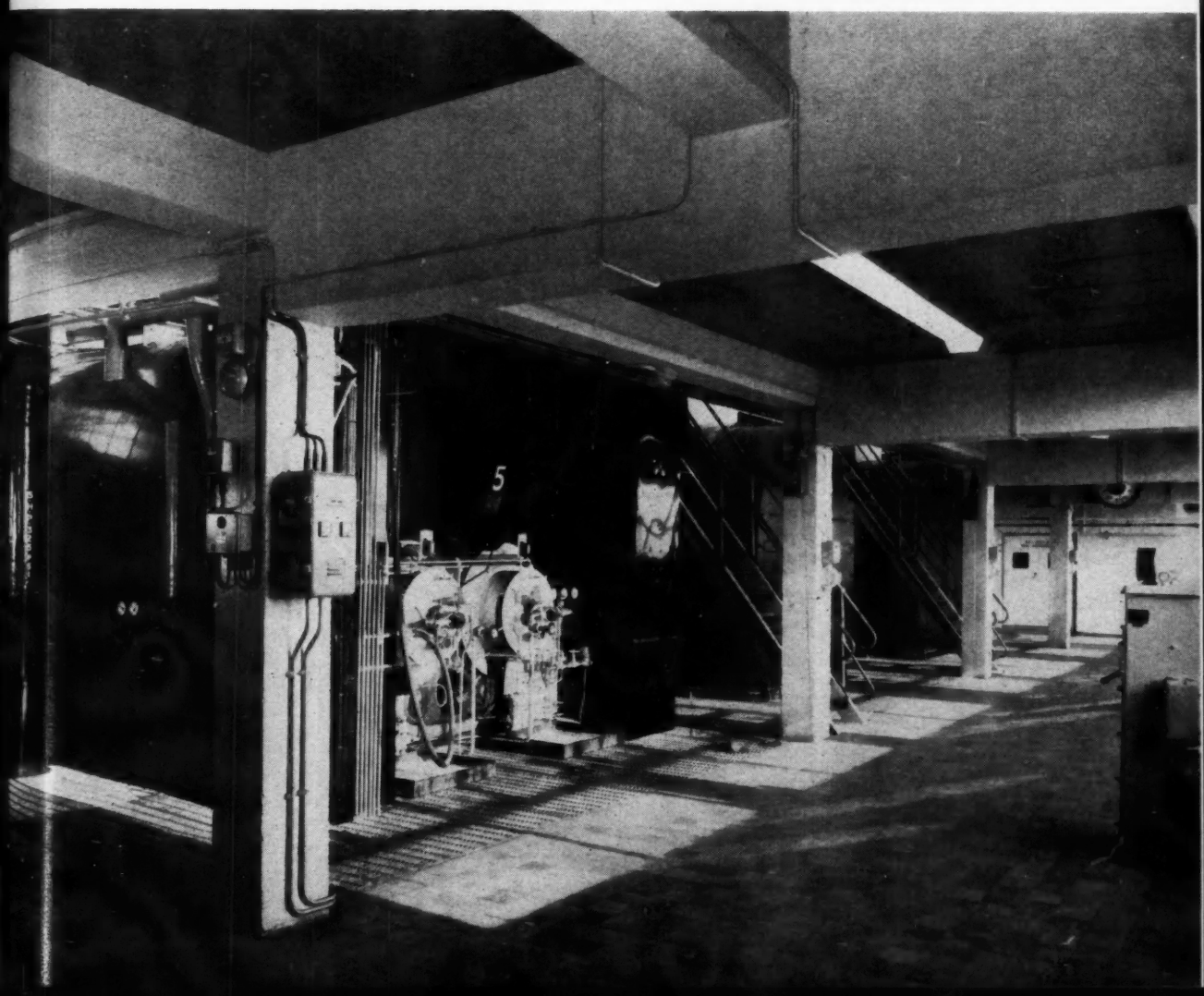
This is the new gas-making plant

The gas-making plant built by W. J. Jenkins & Co. Ltd. consists of four independent benches, each of 35 3¼-ton vertical chamber ovens carbonising either washed smalls or slacks. The benches are in four parallel lines, two of which are placed each side of the central mechanical gas producer plants. Bench brickwork was supplied by Moler Products Ltd., the Consett Iron Co. Ltd. and Mobberley and Perry, Ltd.

The chamber ovens are charged by overhung electrically propelled charging cars, in which is also carried coke breeze for forming the breeze pad at the base of the charge. There are three charging holes at the top of the oven, through which the coal drops from the three charging hoppers.

The top and bottom gas off-takes are both unsealed, the top leading into a dry main. For the first four hours of the carbonising cycle the bottom off-takers are open; steam is admitted towards the end of the carbonising schedule which may vary between 14 and 24 hours.

Coke is discharged from the oven by hydraulically operated, water sealed discharge doors into a coke car, which is propelled by electrically driven haulage chains to the quenching tower outside the chamber house.



Inside the spacious boiler house. The oil-fired boiler is seen on the left, with two waste-heat boilers, representing half the i.v.c.o. boiler plant.

After quenching, a hydraulic hose is attached to the car by bayonet connector and the charge tipped by hydraulic power supplied by an external oil pump into a ground level reinforced concrete hopper.

From here the coke travels by belt conveyor which starts underground and emerges beyond the works main road thoroughfare or 'street,' to the top of the coke grading plant. It is thus delivered to the screens with the minimum of handling, avoiding possible breakage.

The chamber house at Garston is undoubtedly a most unusual feature of the new extensions. Its design by Mr. Ian Maclaren, Dip. Arch. (Liverpool), A.R.I.B.A., who has used reinforced concrete throughout, has very considerable advantages.

It is divided into four main sections, the No. 1 and 2 chamber houses, the producer house which lies between them and the 'forepart' on the boundary wall side of the other three sections, which houses the boiler plant, the power generation plant, and the cloak rooms and canteen, etc., for the whole of the works.

Barrel roofs—construction points

The structure is of reinforced concrete frame and brick panelling and five barrel vault sections in 2¼-in. concrete form the roof of each chamber house, the width and span of one section of which is 32 ft. by 98 ft. These barrel vault roofs, the soffits of which are 90 ft. above ground floor level, are supported on post-tensioned valley beams.

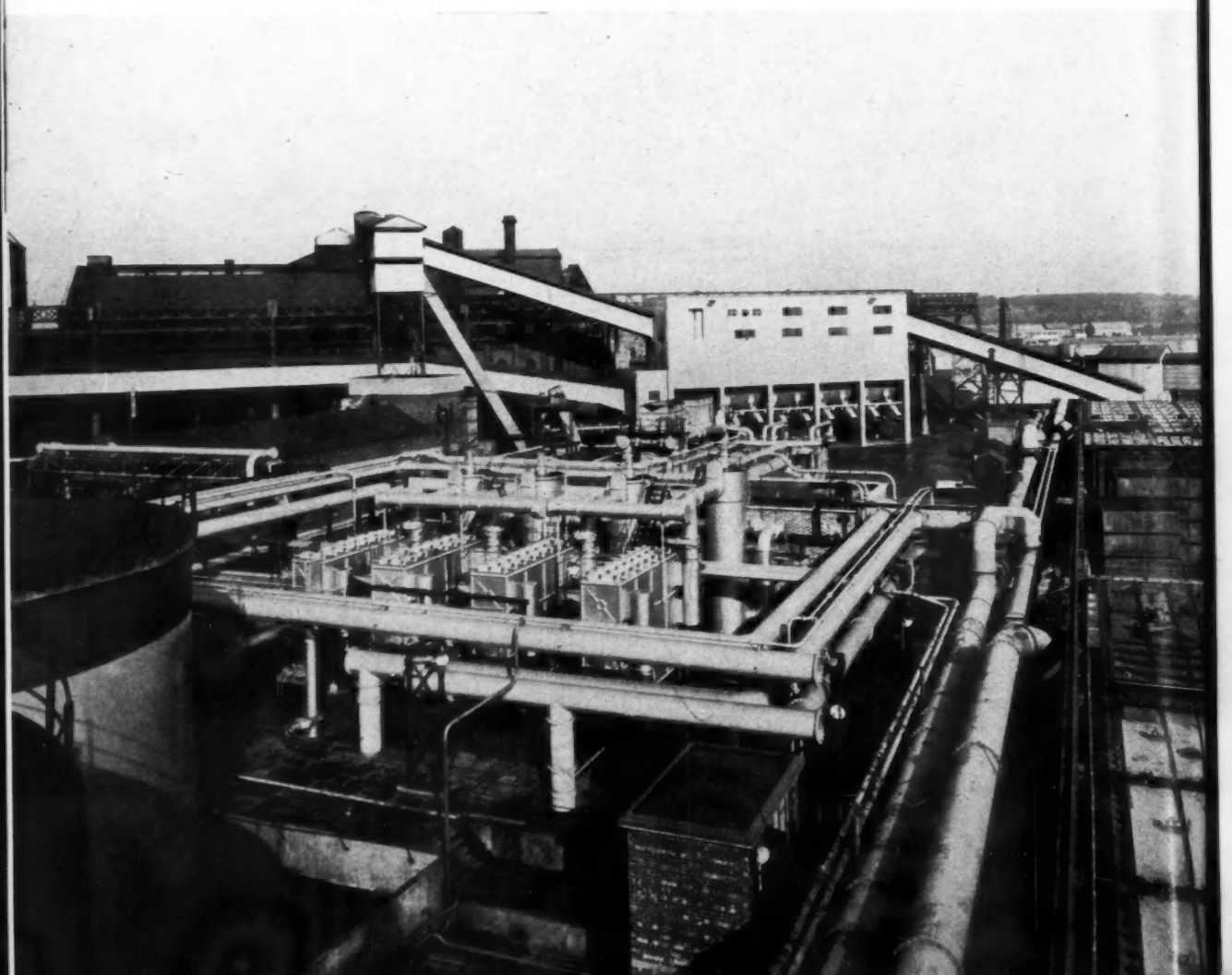
Since these beams span the full width of the chamber house, the whole of this area is free from room supports, and independent of the plant inside it. The roof of the producer house is formed of small shell and flat roofs, and the producer coke bunkers.

There are cellars underneath the ground floor for storing refractories and to aid ventilation. The choice of reinforced concrete instead of a steel-framed structure with a sheeted roof was influenced by the shortage of steel at the time, reduced maintenance costs of the present structure and the ability to erect the whole plant inside the house, which would save a great deal of time.

The actual construction of the barrel roofs was of considerable interest. The tensioning of the valley beams was carried out after the barrel sections were complete, by means of 64 wires for each beam, held at a tension of 17,000 lb. by hydraulic jacks.

The outward appearance of the building is one of func-

In the foreground is the wet purification plant. Behind it is a section of the coal conveyor system with the 700-ton storage bunker.



tionalism but clearly of a design to offer the best possible conditions for those working in it. The 'forepart' containing the amenities is remarkable for its window space, the great care that has been taken to use light and attractive colours for decorating the interior encourages those using this section to make every effort to keep it clean and tidy.

Even the turbo-alternator room and the waste heat boiler section have been painted in light colours.

Since most of the steel needed for the retort house plant would be subjected to corrosive gas works atmosphere before erection, it was all cleaned and shop coated with a fume and chemical resistant primer before delivery. This protective coating prevented chemical impregnation and resultant corrosion of the steel which would have reduced the life of the final painting system.

After erection, the main plant and bunkers were painted with epoxy type undercoat and gloss paint. The insides of the steel chimneys were coated with heat resisting anti-corrosive paint before being brick lined. The chimney exteriors are protected with aluminium high heat resisting paint.

Because of the intense heat, the off takes on the charging floor were painted with a very high heat resisting aluminium paint based on silicone. Other hot surfaces were treated with modified silicone aluminium.

On the economiser floor, the finish consisted in the main of a synthetic enamel which, while withstanding high temperatures, provided a brilliant gloss. On certain plant, working at very high temperatures silicone aluminium paint was again used.

The fronts of the waste heat and oil-fired boilers were painted with a heat resisting black enamel and the backs of the boilers with heat resisting aluminium paint.

Use of colour serves identification

In the turbo-alternator room high gloss synthetic enamel was here employed to provide a tile-like finish highly resistant to wear and ease of cleaning. The colours used served for identification purposes and toned in with the lightness and brightness of the whole house, the walls being finished with Pyrok condensation resisting coating.

All the paint used throughout the chamber house and the coke screening plant, and in the treatment of the purifier boxes, was supplied by Donald Macpherson & Co. Ltd.

Fuel gas to the benches is generated in six Humphreys & Glasgow mechanical producers, each with a designed output of 200,000 cu.ft. an hour of producer gas. They are fitted with self-clinkering grates, cyclone dust extractors and jacket boilers raising steam at 20 p.s.i.g.

The fuel which is graded coke is stored in overhead bunkers and is fed directly into the producers by automatic charges as needed. A break has been left between the hopper mouth and the top of the generator. Gas is fed into a common main, the pressure in which is controlled by an Askania governor operating a butterfly valve in the air supply main.

Each producer has its own instrument panel showing the blast saturation temperature, the steam flow to the producer and the air flow. A panel common to all producers shows the producer gas pressure, the blast main pressure, the proportion of CO_2 in the gas leaving the plant, its temperature and the pressure of the steam raised in the jacket boilers.

There are three electrically driven air blowers, one a standby. The isolation of a producer from the main is by spectacle valves and sand seals.

Flexibility is the outstanding feature of the power production section of the new extensions. Although a very careful steam power balance had been worked out allowing for daily and seasonal variations in plant loads and great care has been taken in determining waste heat production figures, many variables which cannot be controlled may affect these calculations.

The installation of oil-fired boilers for supplement steam supplies at times of peak steam demands was somewhat unorthodox, but their convenience of operation and flexibility—not to mention the smaller ground space and lower capital cost—was essential for the smooth running of this integrated power scheme.

Highest steam pressure for a gasworks

The high cost of steam raised from oil-fired boilers compared to waste heat steam, however, restricts their use; in fact it is far cheaper to import electricity from the public supply.

Should the maximum demands on the local public supply be exceeded and extra charges likely to be realised, a nice balance must be struck between the use of such steam and imported power.

There are four waste heat and two oil-fired boilers divided equally between the two sections of the chamber house, all raising steam at 325 p.s.i.g. and 715°F., a higher steam pressure than in any other British gasworks.

The waste heat boilers, supplied by Spencer Bonecourt and Clarkson Ltd., are 9 ft. in diameter and 15 ft. 6 in. between the tube plates. With a heating surface of 4,250 sq.ft., each has a maximum rating of 10,000 lb. of steam per hour from waste gases at 650°C.

With superheaters in the hot gas path, a final steam temperature of 715°F. is reached, which is regulated by de-superheaters automatically controlled. Steaming type economisers reduce the temperature of the final exit gases to 200°C.

The induced draught fans are driven by 70-b.h.p. variable speed slip-ring motors and are capable of carrying a volumetric overhead of 20%.

The oil-fired boilers, for standby purposes only, are generally only raising enough steam to maintain a constant pressure in the high pressure steam main. They are fitted with Laidlaw Drew automatic firing equipment, using 1,000-seconds oil, which is controlled by the pressure in the high pressure main. The output may vary between 2,000 and 13,000 lb. of steam an hour. Steam valves were supplied by Hopkinsons Ltd. of Huddersfield.

Electric power is generated by two turbo-alternators, each consisting of a Hick Hargreaves passout turbine driving an L.D.C. generator through a David Brown gear box. With an output capacity of 2,200kW at 11 kV, 50 cycles, this power plant is large enough to supply the whole of the works' demands for electric power.

Normally the whole of the high pressure steam raised at 325 p.s.i. is supplied to the turbines, which passout steam to the low pressure steam system at 20 p.s.i.g. and a vacuum of 28 in. Hg., the quantity of passout being automatically regulated by the process steam demand. This is likely to vary considerably because of the variety of uses, from benzole recovery to space heating, to which it is put.

From a control room located near the generating sets at operating platform level, the operator can get a composite picture of the whole power layout. Here there is both an electrical control panel and also an instrument panel indicating the steam flows from the boilers and at various key points in the steam system.

Parallel with the works power system are duplicate 11 kV feeds from the local grid supplies. These three sources of electrical power are connected to the main high voltage switchboard through 400-A circuit breakers, To ensure continuity of power supply, this board, divided into two sections by a bus coupler, supplies transformers at strategic points in the works through duplicate 11 kV cables.

In each transformer station there are two 1,250-kVA transformers, from which supplies are taken to a main distribution board at 415 V; each board has duplicate sets of circuit breakers rated at 1,000 A with a 2,000 A bus coupler.

Altogether, duplicate supplies have been brought to 13 sub-boards feeding individual distribution systems for each section of plant.

In the works as a whole the prime movers are electric motors but where reliability and ease of control have been considered of paramount importance, steam drives have been employed, as in the exhauster and standby booster drives.

How the ancillary plant is used

In such cases back pressure turbines or engines running on steam at 120 p.s.i.g. and 500°F, raised in the existing waste heat boiler plant, and exhausting at 20 p.s.i.g. have been installed. Vital electric drives, such as those to the boiler feed pumps, the waste heat boiler induced draught fans and others, have been duplicated by steam drives.

In addition to being able to keep this plant running during electrical failures, such an arrangement increases flexibility since it enables power and steam production at various pressures to be balanced to give the greatest efficiency. To guard against total power failure, a diesel driven alternator can supply power to the main boiler auxiliaries.

To treat the gas from this new carbonising plant, a number of items of ancillary plant have been added but wherever possible existing plant has been adapted.

The gas leaves the chamber house in two streams, each stream, equivalent to 7 mill. cu.ft. of gas a day, being treated separately until it has passed the purifiers. There are two primary condensers, manufactured by W. C. Holmes & Co. Ltd., each of 7 mill. cu.ft. a day capacity and capable of cooling the gas from 176° F. to 60° F., using bore-hole and recirculated water.

To the existing exhauster plant of three 5-mill. cu.ft. a day steam driven exhausters, two 8-mill. cu.ft. a day Holmes Connersville 18-in. by 42-in. machines have been added. They are driven by Bellis and Morcom compound steam engines from the intermediate pressure steam system exhausting to 20 p.s.i.g.

Gas detarring is carried out by an existing 6-mill. cu.ft. a day electrostatic detarrer which runs in parallel with a 5 to 7-mill. cu.ft. a day vessel brought in from another works.

Of the two ammonia washers, one is an existing Holmes multi-film washer which has been up-rated to deal with the extra volume of gas and the other, working in parallel with it, is a new Holmes unit with a capacity of 8 mill. cu.ft. a day.

Special anti-corrosion measures

Tray purifiers, installed by the Board's Construction and Maintenance department consist of two 5-box sets in parallel, each with a capacity of 7 mill. cu.ft. a day. Each box holds a total of 250 tons of oxide contained in 18 trays, 13 ft. 6 ins. square by 3 ft. 6 ins. deep.

Special steps have been taken against corrosion of the boxes. After allowing a weathering period to de-scale the surface followed by a thorough cleaning by mechanical wire-brushing, red-lead primer, followed by epoxy type undercoat and finishing paint were used for the tops and sides. Tests carried out inside the boxes with cold cured epoxy resin based paints have proved most satisfactory.

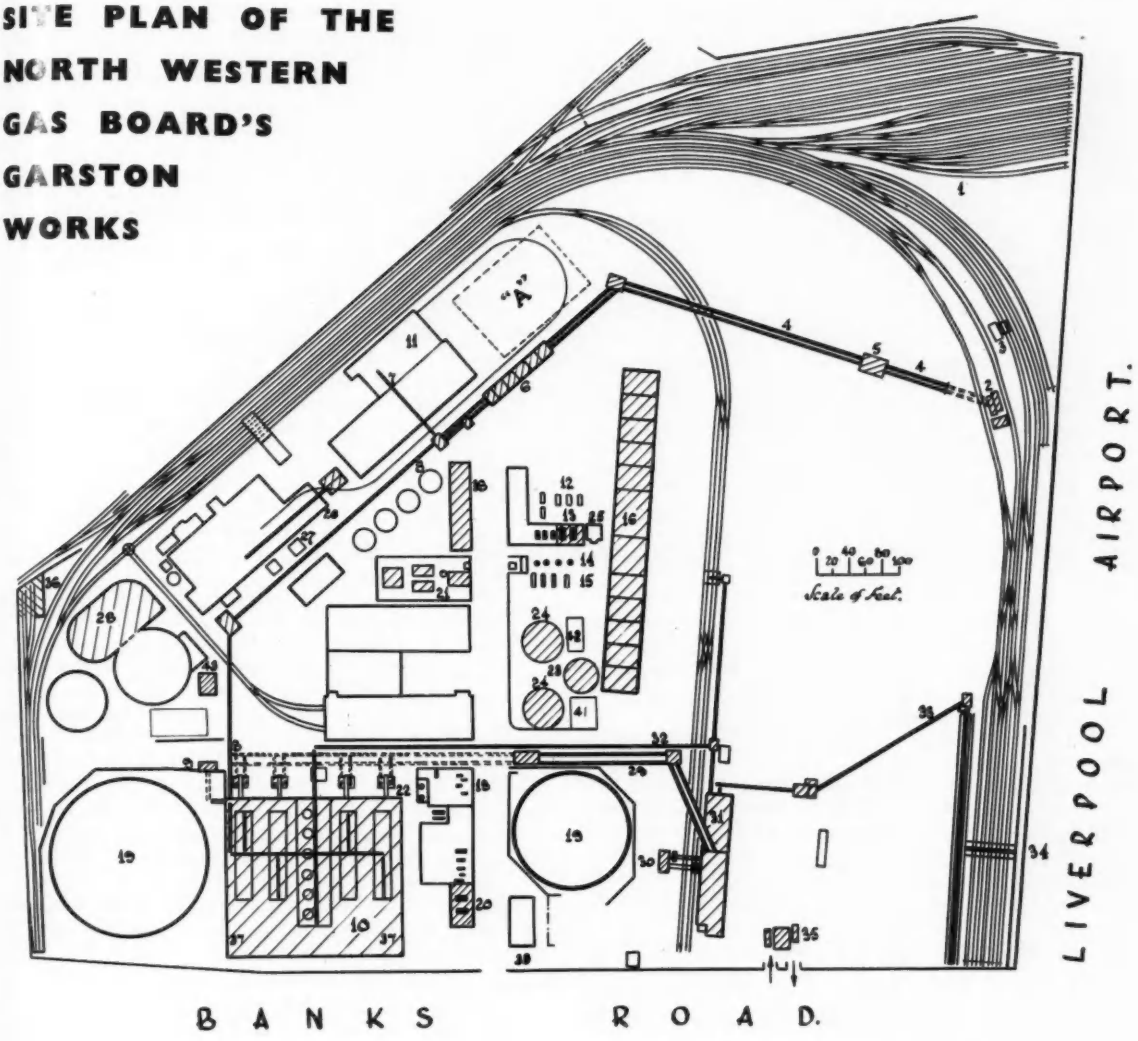
The gas emerging from the benzole scrubbers passes through the station meters to the existing gasholders. A 6 mill. cu.ft. a day meter has been removed to give room for two new 18 in. by 54 in. Holmes-Connersville meters, each with a capacity of 7-8 mill. cu.ft. a day. Modifications to an existing gas dilution plant were carried out by the Power Gas Corporation Ltd.

The capacity of the existing gas boosting plant has been increased by installing two Bryan Donkin machines of 600,000 cu.ft. an hour with a pressure rise of 4 p.s.i.; each is directly coupled to 316-h.p., 415-V electric motors driving through scoop controlled fluid couplings, the scoop movement being controlled by a servo-governor from the booster outlet main.

Thus changes in booster outlet pressure cause corresponding variations in booster speed without affecting the motor speed. Gas valves and connections were supplied by Westwood & Wright Ltd.

As already mentioned, coke from the chamber house, after

SITE PLAN OF THE NORTH WESTERN GAS BOARD'S GARSTON WORKS



1. *Rail tracks.*
2. *Tipplers.*
3. *Weighbridge and sidings controller.*
4. *Overhead conveyors.*
5. *Crusher house.*
6. *Overhead bunkers.*
7. *C.v.r. coal conveyor.*
8. *Coal conveyor.*
9. *Reclaiming elevator.*
10. *Intermittent vertical chamber house.*
11. *Continuous vertical retort house.*
12. *I.v.c.o. condensers.*
13. *I.v.c.o. exhausters.*
14. *I.v.c.o. detarrers.*
15. *I.v.c.o. washers.*
16. *I.v.c.o. tray purifiers.*
17. *C.w.g. and c.v.r. oxide handling.*
18. *I.v.c.o. metering.*
19. *Gasholders.*
20. *Two electric driven and one turbine driven booster.*
21. *Concentrated ammonia plant i.v.c. and c.v.r.*
22. *Benzole extraction plant, i.v.c. and c.v.r.*
23. *I.v.c. tar tank.*
24. *Liquor tanks.*
25. *Separator.*
26. *No. 1 deep well pump.*
27. *No. 2 deep well pump.*
28. *Cooling tower.*
29. *Coke from I.v.c.o. conveyor.*
30. *Coke from stock, twin skip hoist.*
31. *Screening.*
32. *I.v.c.o. producer coke.*
33. *Stocking and wagon loading.*
34. *Moving gantry conveyor.*
35. *Lorry weighbridge.*
36. *Loco shed.*
37. *Oil-fired boiler plant.*
38. *Laboratory.*
39. *Club room.*
40. *Lorry washing.*
41. *Benzole storage tanks.*
42. *I.v.c.o. tar and liquor separator.*
43. *Rack cooler for benzole plant.*

quenching, travels by belt conveyor to the new screening plant. This plant together with the conveyor system is another feature of the new extensions.

The building itself is reinforced concrete 193 ft. long by 37 ft. 6 in. wide by 124 ft. high, including the skip tower, and has a storage capacity of 1,500 tons of i.v.c.o. coke and 550 tons of c.v.r. coke. On the lorry loading side, there is a reinforced concrete canopy of shell design, 181 ft. long by 25 ft. wide.

From the new carbonising plant quenched coke travels by twin 30-in. troughed belt conveyors at the rate of 60 tons an hour by way of a junction tower to the coke grading plant. The distance covered by these two sets of conveyors is considerable, the first being set at 600-ft. centres and the second being housed in an aluminium sheeted gantry of 135 ft. span.

All coke above 3 in. is separated by one of two grizzley scalping screens and passes to the oversize compartment of 375 tons capacity by way of a 3-way chute, one leg of which is fitted with a spiral lowering chute to reduce breakage during its progress.

The other two legs make it possible to fill this large storage compartment effectively. Coke below 3 in. passes to two lines of reciprocating screens—one for each grizzley—of 45 tons per hour capacity and is separated into four sizes: 0 to ¾ in. (breeze), ¾ in. to 1¼ in., 1¼ in. to 2 in., and 2 in. to 3 in.

The breeze from each line of screens passes to a Jenkins Viking Major screen in a chamber below where it is further separated to 0 to ⅜ in. and ⅜ in. to ¾ in. sizes and stored in their respective bunkers both of 75 tons capacity.

The fourth size of coke—2 in. to 3 in.—is fed from the screen on to an inclined 24-in. belt conveyor and travels to an end bunker compartment of 450 tons capacity which it enters by way of a 3-way chute similar to that fitted to the oversize compartment.

The other two intermediate sizes pass directly to their respective storage bunker compartments of 225 tons, and 300 tons capacity respectively.

Any size of coke may be delivered

Run-of-retort coke from the c.v.r. plant and coke reclaimed from stock are brought by lorry and tipped into twin concrete hoppers at ground level, each of which is fitted with runaway beams and an 8-in. square mesh screen plate. Hopper outlets to the bunkers are fitted with fully automatic loading chutes which feed the coke into twin skip hoists of 30-tons an hour capacity.

Travelling at a speed of 153 ft. a minute they elevate the coke to a height of 145 ft. and discharge it into twin hoppers. Each hopper, fitted with four rack and pinion outlets, feeds the coke on to twin 30-in. reversible belt conveyors, 60 ft. long, on which the coal travels to either the c.v.r. screens or to the i.v.c.o. screens just described.

Both screening systems are similar, except that in the former the grizzley scalping screens separate all coke above 2 in. Any size of coke may be delivered from the storage bunkers through slide doors operated by gears and hand chains.

Coke may be loaded over travelling and fixed Viking debreezing screens into lorries or railway wagons. By means of Avery automatic bag weighing machines, debreezed coke may be loaded in 1-cwt. or ½-cwt. bags at the rate of 12 tons per hour; gears and gear boxes supplied by Northern Manufacturing Co. Ltd.

On the rail wagon loading side, coke may be fed from any outlet on to a 24-in. belt conveyor running at 227 ft. per minute for delivery at 50 tons per hour back to the chamber house as producer fuel or pad coke.

From the 24-in. belt, coke may also be fed to a 30-in. belt of 80 tons an hour capacity, travelling at 220 ft. an hour, for transport to additional rail wagon loading sidings. Travelling by way of a junction tower and an intermediate coke house, where it is debreezed at the rate of 80 tons per hour on a single deck high speed vibratory screen, the coke is delivered to the main loading bay 250 ft. away.

Here the coke is transferred to a 30-in. belt running the full length of the 350-ft. bay. A travelling throw off carriage transfers the coke to a travelling bridge equipped with a conveyor from which there are discharge points located over five lines of railway track.

By this means empty wagons direct from the coal tippers are filled with coke and made up into trains.

Fume and abrasion resistant coating

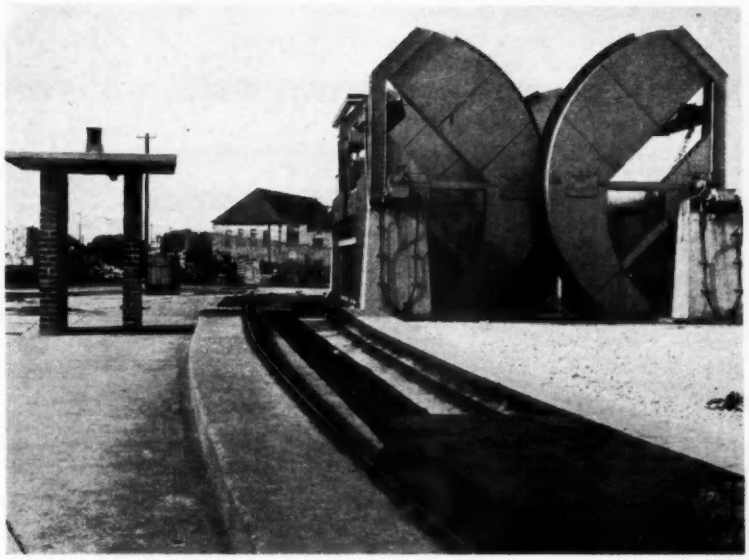
For the coke screening plant gloss paints based on epoxy resin were selected as a final coat for all plant and conveyors, chiefly because of the hardness and the fume and abrasion resistance of this type of coating.

The colours chosen were such that each section of the plant handling a set type of coke was a standard colour throughout the building, the shades blending into a bright and attractive colour scheme.

Thus the delivery chutes for various sizes of coke were different colours and assisted drivers when loading coke for bulk delivery. The outside skip-hoist and other exterior steelwork was also protected with the same epoxy resin based system. To add brightness and cleanliness, the interior walls and ceilings were coated with Powerkote emulsion paint.

Tar and liquor from the new carbonising plant are stored above ground in tanks of 350,000-gal. capacity, supplied by R. & J. Dempster Ltd., and the ammonia liquor treated in a new automatic concentrated ammonia plant, manufactured by Newton Chambers and Co. Ltd. Here liquor of 1 to 2% ammonia content from both carbonising plants is concentrated to 25% ammonia content at the rate of 3,000 gal. an hour. Liquor is stored in two tanks, each of .5 mill. gal.

The increased water demands of the new extensions have made necessary the sinking of a second bore-hole. Of similar dimensions—21 in. diameter and about 700 ft. deep—but equipped with a larger electrically driven bore hole pump, it can supply 35,000 gal. an hour, compared to the present rate of 20,000 gal. an hour.



Rotoside wagon tipplers, with a capacity of 30 wagons an hour, which can accommodate wagons up to 25 tons net weight.

This will be ample to meet the estimated demands of 28,000 gal. an hour, but during periods of pump maintenance, the existing source augmented by the town supply and water from the cooling tower pond will be used. The latter has a reserve of 285,000 gal.

Cooling water requirements for the works are drawn from a central cooling tower plant supplied by the Davenport Engineering Co. Ltd. of the multicell induced draught type. Constructed of shell concrete, it is capable of cooling 320,000 gal. of water an hour from 97°F. to 65°F.

Of the two separate water circulating systems, one of 110,000 gal. an hour serves the power plant and the other supplies process water requirements.

In a pump house near the cooling plant six vertical spindle pumps, each with a capacity of 66,000 gal. an hour have been installed. Of these, two serve the power plant and three handle the process water with two pumps standby.

To guard against a total power failure, a standby diesel-driven pump can supply water to the condensers and the turbo-alternator. Provision has been made for extending the water cooling system should the need arise at some future date.

Well-thought-out amenities design

Boiler feed water is treated in a 10,000 gal. per hour Thompson-Kennicott lime-soda plant which has been extended to include a base-exchange unit. The treated water of zero hardness, needed for the high pressure boiler plant, undergoes slug phosphate dosing and sulphite treatment after de-aeration.

A great deal of thought has been given to the design of the amenity section of the works which is housed in the 'forepart' of the chamber house building. Each section of those employed at the works has been catered for.

On the ground floor there are lockers for the day men, one set for clean and one set for dirty clothes; both sets are heated and ventilated. Laid out for 170 men, which includes separate accommodation for purifier men, there are showers in addition to the normal ablutions and toilets.

On the first floor there is a canteen including a cafeteria service. Food is cooked in well equipped, gas-fired kitchens and a separate air extraction system is included. On this floor, too, is the staff canteen and the chief executives' suite. Separate accommodation is provided for the canteen staff which includes a ladies' locker-room.

The second floor is confined to amenities for the shift men, and includes separate compartments for the carbonising supervisor and the shift captain. Here, too, lockers are provided in a well ventilated room and a messroom in which food may be heated up, allows the shift men to eat their food in attractive surroundings.

In fact, a great deal of attention has been given to the choice of colours used in the decoration of the inside of this building, and wherever possible light pastel shades have been used.

The effect is most pleasing and does a great deal to dispel the idea that a gasworks must necessarily be a grim, dreary place.

LIST OF CONTRACTORS—GARSTON EXTENSION

The main contractor for the carbonising plant and coal and coke handling, storage and grading plants was **W. J. JENKINS & Co. Ltd.**

Sub-Contractors to W. J. Jenkins & Co. Ltd.

Foundations and Buildings

Foundations and R.C. structure for :—I.V.C. house, underground coke handling plant, 700-ton coal bunker, breeze bunker : *Taylor Woodrow Construction Ltd.*
Cladding to I.V.C. house, new boundary wall, reclaiming coal and breeze hopper : *Leonard Fairclough Ltd.*
R.C. structure for coke screening plant and foundations for coke conveyors : *J. L. Kier & Co. Ltd.*
Coal tippler hopper, R.C. structure for crusher house and coal conveyor foundations : *Norwest Constrution Co. Ltd.*
Cladding for coal crusher house : *James Tomkinson & Co. Ltd.*
General plumbing work (main contract—plumbing for forepart of I.V.C. house) : *Plumbers (North Western) Ltd.*
Aluminium window frames and sheet cladding to I.V.C. house : *Mellowes & Co. Ltd.*
Cork and felt covering to I.V.C. house roofs : *Permanite Ltd.*
General floor tiling in alternator house, main locker rooms, ablutions etc.: *Carrara Marble Co. (Liverpool) Ltd.*
General floor tiling I.V.C. house forepart, main staircases, etc.: *Fullers (Paving & Tiling) Ltd.*
Sound-proof wall and ceiling finish in alternator house : *Decorators (Liverpool) Ltd.*
Lightning conductors on I.V.C. building : *W. J. Furse & Co. Ltd.*
Waterproof lining to various drain channels in I.V.C. house : *Quickset Water Sealers Ltd.*

Handling plant

Coal tipplers and rail wagon haulage beetles : *Strachan & Henshaw Ltd.*
Conveyor steelwork and I.V.C. house chimneys : *Wm. Neill & Son (St. Helens) Ltd.*
Conveyor steelwork : *Edward Bidgood & Co. Ltd.*
Aluminium conveyor side and roof sheeting : *Freeman, Morrison Ltd.*
Power cabling for handling plant : *W. H. Smith & Co. Electrical Engineers Ltd.*

Carbonising plant

I.V.C. producer plant : *Humphreys & Glasgow Ltd.*
Waste heat boiler plant : *Spencer-Bonecourt-Clarkson Ltd.*
Machinery guards : *W. Flanagan & Son Ltd.*
General structural steel and welded plate work : *R. McIvor & Sons Ltd.*
Vacuum cleaning plant and general ventilation work in I.V.C. house : *Sturtevant Engineering Co. Ltd.*
Power cabling and general lighting work : *Winstanley & Lambert Ltd., E.P.I. Ltd.*

General

Coke plant lift : *Wm. Wadsworth & Sons Ltd.*
I.V.C. house lifts : *Gimson & Co. (Leicester) Ltd.*
General welding and plate fabrication work : *The Garston Welding Co. Ltd.*
Clothes lockers in main ablutions centre : *Norwood Steel Equipment (London). Ltd.*
Plenum ventilation plant in forepart of I.V.C. plant : *G. N. Haden & Sons Ltd*

Suppliers to W. J. Jenkins & Co. Ltd. and their sub-contractors

Coke loading transporter : *Fraser & Chalmers Engineering Works.*
Electric motors : *Lancashire Dynamo & Crypto Ltd.*
Gear boxes and reduction gears : *Northern Manufacturing Co. Ltd.*
Open-steel floor units and handrail stands : *Fisher & Ludlow Ltd.*
General pre-cast concrete work (mainly for I.V.C. house cladding) : *Ferroconcrete (Lancashire) Ltd.*
Steam valves : *Hopkinsons Ltd.*
Pumps (general) : *Lee, Howl & Co. Ltd.*
Tar and liquor pumps : *Appleton & Howard Ltd.*
Water pumps associated with steam and power plant : *G. & J. Weir Ltd.*
Economisers on waste heat boiler and oil-fired boiler plant : *E. Green & Son Ltd.*
Waste heat boiler superheater plant : *The Superheater Co. Ltd.*
Pumps (general) : *Joseph Evans & Sons (Wolverhampton) Ltd.*
Conveyors belts : *B.T.R. Industries Ltd.*
Chamber bottom door opening gear : *Lockheed Hydraulic Brake Co. Ltd.*
Coal and coke conveyor belt weighers : *Samuel Denison & Son Ltd.*
Bench brickwork : *Mobberley & Perry Ltd., Moler Products Ltd., Consett Iron Co. Ltd., Harris & Pearson Ltd., Stourbridge Refractories Co. Ltd.*
Coal samplers (from conveyors and sludge dumps) : *International Combustion (Holdings) Ltd.*
Electronic level device in coal conveyor chutes : *Lancashire Dynamo Electronic Products Ltd.*
De-aerators and pumps for steam plant : *Hick, Hargreaves & Co. Ltd.*

Other contractors (direct to Gas Board and sub-contractors)

Foundations and Buildings

Booster house. Tank farm foundations and containment, C.W.G. coke plant hopper and foundations, cooling towers, general site concrete : *Holst and Co Ltd.*
General site concrete, coke plant yard, oxide stock yard, general drainage work. Demolition work : *Lawrence Marr & Son.*
Electrical switchrooms. Fitting shop ablutions centre C.V.R. coke bunker foundations, C.A. plant foundations and general building work : *Leonard Fairclough Ltd.*
Exhauster house extension, detarrer and washer foundations, general building work : *James Tomkinson & Co. Ltd.*
Footpath boundary wall replacement : *Norwest Construction Co. Ltd.*
Tray purifier foundations : *G. Dew & Co. Ltd.*
Building work for new laboratory : *Henry Boot & Sons Ltd.*
Coke weigh office, meter house roof, H.T. switchroom modifications. General painting and decoration : *Molyneux (Liverpool) Ltd.*

Railway Sidings

All railway sidings : *Thomas Summerson & Sons Ltd.*

Sub-contractors to Thomas Summerson & Sons Ltd. :

Earthworks and civil work for sidings (including control cabin, new boundary wall, loco house, elevated gantry, etc.) : *Leonard Fairclough Ltd.*
Electro-pneumatic points gear : *Westinghouse Brake & Signal Co. Ltd.*
Hydraulic wagon retarders (hydrabrake units) : *Strachan & Henshaw Ltd.*
Pre-cast R.C. boundary wall units : *Wettern Bros. (Manchester) Ltd.*
Loco house doors : *Bolton Gate Co. Ltd.*
Loco house crane : *Herbert Morris Ltd.*
C.V.R. coke bunker modifications : *Francis Morton & Co. Ltd.*
Two diesel electric locomotives : *Yorkshire Engine Co. Ltd.*

Ancillary Plant

Interconnecting gas, steam, water, tar and liquor pipework : *Unit Superheater & Pipe Co. Ltd.*
Condensers, exhausters, washers, detarrers, meters and local connections and valves : *W. C. Holmes & Co. Ltd.*
One booster gas valve : *The Bryan Donkin Co. Ltd.*
One booster, two booster motors and switchgear : *The British Thomson-Houston Co. Ltd.*
C.A. plant : *Newton, Chambers & Co. Ltd.*
Purifier and meter connections : *Thomas Blackburn & Sons Ltd.*
Tar and liquor tanks : *R. & J. Dempster Ltd.*
Modifications to producer gas dilution plants : *The Power-Gas Corporation Ltd.*
Producer gas plant connections and general valves : *Westwood and Wrights Ltd.*
C.W.G. coke plant : *James W. Ellis & Co. Ltd.*
Borehole water pumps and site investigation borings : *E. Timmins & Sons Ltd.*

Power Plant and Electrical Works

Power generating plant and de-aerator plant : *Hick, Hargreaves & Co. Ltd.*
Oil-fired boiler plant : *Edwin Danks & Co. (Oldbury) Ltd.*

Sub-contractors to Edwin Danks & Co. (Oldbury) Ltd. :

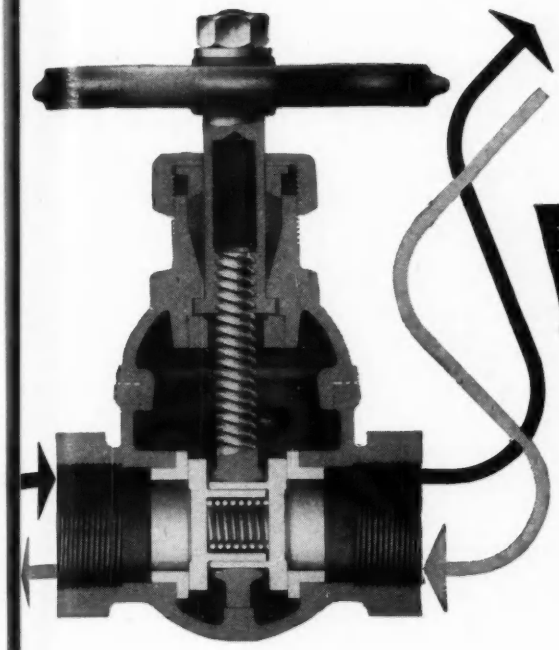
Superheaters : *Unit Superheater & Pipe Co. Ltd.*
Oil-firing equipment : *Laidlaw, Drew & Co. Ltd.*
Economisers : *E. Green & Son Ltd.*
Alternator house crane : *Vaughan Crane Co. Ltd.*
Main H.T. and L.T. switchgear : *A. Reyrolle & Co. Ltd.*
Interconnecting power cabling, alternator cable work, general electrical work : *Campbell & Isherwood Ltd.*
General power and lighting work : *E.P.I. Ltd.*
Thermal insulation work for majority of plant : *Joseph Nadin Ltd.*
Power and lighting work : *Winstanley & Lambert Ltd.*
Main cooling towers : *The Davenport Engineering Co. Ltd.*
Cooling water pumps : *Sulzer Bros. (London) Ltd.*
Machinery drive conversions. Exhauster engines : *W. H. Allen Sons & Co. Ltd.*
Water softening plant : *John Thompson-Kennicott Ltd.*
Instrumentation work : *R. Hutcheon Duthie & Son Ltd.*

General

General building, plumbing, paint and decorating work : *Anderson Molyneux Ltd.*
Painting and decorating work : *Hayes & Barnard.*
Ventilation plant in coke plant and I.V.C. plant : *Sturtevant Engineering Co. Ltd.*

Suppliers to North Western Gas Board's contractors and other contractors

Tray purifier crane : *S. H. Heywood & Co. Ltd.*
Tray purifier platework : *Francis Morton & Co. Ltd.*
Steam traps : *Drayton Regulator & Instrument Co. Ltd.*
Steam valves : *Hopkinsons Ltd.*
De-superheater equipment : *James Gordon & Co. Ltd.*
S.W.L. main transformers : *Foster Transformers Ltd.*
Electric cables : *Enfield Cables Ltd., British Insulated Callender's Cables Ltd.*
Electrical control and switchgear : *Metropolitan-Vickers Electrical Co. Ltd., W. H. Allen Sons & Co. Ltd.*
Instrument panels : *Hartons Installations Ltd.*
Fluid flywheels : *Fluidrive Engineering Co. Ltd.*
Tar and liquor pumps : *Lee, Howl & Co. Ltd.*
Electrical switchgear : *Parmiter, Hope & Sugden Ltd.*
Electric motors : *Lancashire Dynamo & Crypto Ltd.*
Switchgear and control gear : *Brookhirst Switchgear Ltd.*
Gear boxes etc.: *David Brown Gears (London) Ltd.*
Paint : *Donald Macpherson & Co. Ltd.*



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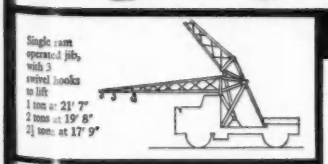

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2 tons at 19' 8"
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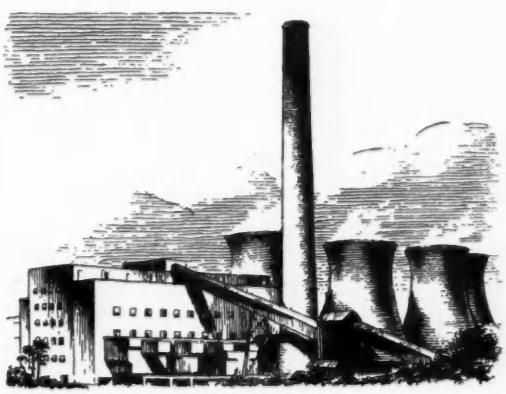


WATER COOLING SPECIALISTS

Technical developments

New tube bender

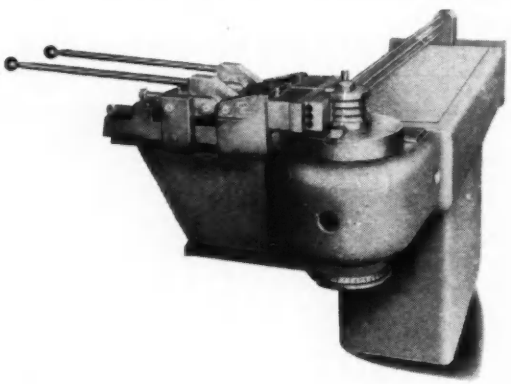
A FURTHER swinging arm type of draw bending machine has been added to the extensive 'Staffa' range of tube and pipe benders.

Listed as the DB-50, this fast, accurate and dependable machine introduces a major development into bending machinery, enabling the user initially to purchase a low priced hand operated basic machine, and then to add standard accessories at a later date as required.

The extras include power operated clamps, pressure dies, mandrel withdrawal, length stops, force feed lubrication through hollow mandrels, plane of bend indicator, automatic cycle control, multiple angle of bend set-up, etc., all of which can be easily installed by the users by their own maintenance departments.

The 'Staffa' DB-50 draw bending machine has a capacity for bending 2-in. nominal bore 'heavy' grade pipe, or equivalent, to the bends described in B.S.S. 1387. It will also bend tube of larger diameter and lighter gauge, in both ferrous and non-ferrous materials.

The machine frame is an electrically welded assembly of folded heavy gauge mild steel channels and a high duty



steel casting of ¾-in. minimum thickness, accurately bored and faced after welding. The standard bed length is 6 ft. but longer beds can be supplied.

A welded steel tank of 10 gallons capacity contains a high efficiency gear type pump of 3½ G.P.M. delivery at 2,000 p.s.i. The pump is driven through a flexible coupling direct from the flange mounted motor. The return hydraulic fluid passes through a replaceable cartridge microfilter, and all internal piping is of seamless steel tubing. The main drive sprocket is a fully heat treated forging, machined all over and secured to the spindle by a triple key system. The main drive is by a high tensile roller chain from the hydraulic ram. The swinging arm is fabricated from mild steel plate and is keyed at top and bottom to the main spindle, while the top plate is machined to carry the adjustable clamping mechanism.

Both the main and return rams are 'Staffa' type single acting rams, with synthetic rubber seals and bronze piston rod guides. The piston rods are made of steel, chrome plated and ground to ensure maximum seal life. The cylinders are made of mild steel with honed bores and are screwed externally to retain the end caps. All piping is of seamless steel tubing and aircraft type flexible hoses.

The four-way double acting spool type of control valve is fitted inside the main frame, and incorporates a relief valve set to 2,000 p.s.i. The 'Staffa' DB-50 bender can be fitted with six adjustable length stops, sliding on a shaft mounted in bearings, and parallel with the mandrel rod.

The angle of bend indicator is basically a circular scale graduated 0° to 190°, and an adjustable striker and limit switch. The indicator, by controlling the actual angle of bend rather than the ram displacement, ensures uniformity of bends in batches.—*Chamberlain Industries Ltd.*

Foam spray equipment

AS a result of a joint development programme The Aerograph-DeVilbiss Co. Ltd. have demonstrated their new 'Foam-in-Place' equipment which sprays rigid polyurethane foam made to a special formulation by the Baxenden Chemical Co. Ltd.

Until the development of the new spraying technique there had been two methods of producing foam: 1, Machine mixing, using special and necessarily expensive equipment for the production of foam sheets or blocks. 2, Batch mixing in buckets (using hand or electric stirring).

In either case it was necessary to use some form of shuttering or battening to retain the foam in position.

In some instances the older methods will continue to remain the most economic method of foam production, but a large number of applications particularly lend themselves to this new simplified spray system.

Some of these applications were shown during the demonstration which included a quick-fire spray insulation of a large section of steel plate, a roof interior, a complex but typical arrangement of service pipes, a ventilation duct and storage tank.

Specifications: Baxenden rigid polyurethane foam; type R.329 Celspray, Freon-blown ('Freon' is a

registered trade mark of E. I. Dupont de Nemours Co.).

Mixing ratio: 100 parts by weight of Component A; 70 parts by weight of Component B. Mixing temperature 60°-75°F. Density: Minimum 1.1 lb/cu.ft.; 1.4 lb/cu.ft. section cut after spraying. 1.6 lb/cu.ft. overall average including outer skin.

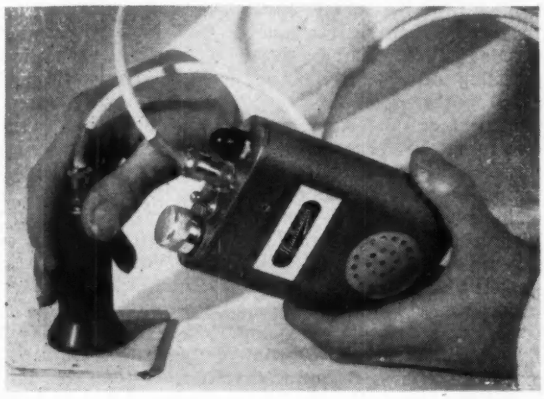
K. Factor: 0.11 to 0.14 B.t.u./hr/sq.ft./°F/in. at 75° F. mean. Compressive Yield Strength: 15 p.s.i.—*The Aerograph-DeVilbiss Co. Ltd.*

Audio thickness gauge

WITH the extensive present day use of the metal spraying process for the protection of steel structures the question of inspection and quality control becomes more urgent. Because thickness is an important part in the protective value of sprayed metal coatings it is essential that this should be adequately checked.

The introduction of an entirely new type of measuring instrument goes a long way to reducing the problem. This instrument which has been designed specifically for sprayed zinc and aluminium coatings enables large areas to be checked rapidly.

The principle of its operation is based upon an exploring head which may be moved quickly over the coated surface.



The instrument having been set to indicate a minimum thickness gives an audible warning of areas which are below the required thickness. Accurate test specimens are used to set the gauge to any desired thickness between 0.002 in. to 0.012 in. The set is completely portable, fully transistorised and the miniature operational battery has a life of over four months. It is unaffected by magnetic fields or stray magnetism.

While the exploring head is designed for flat surfaces adaptors are being designed to enable the unit to measure curved surfaces and tubes.—*Metallisation Ltd.*

Trade Publications

A very substantial brochure, entitled 'Visco Dust Collection,' No. 604, supersedes the previous publication No. 574 'Modern Dust Collection', published in 1957. The principal differences between this brochure and the previous ones are that the text has been revised and rearranged, and a complete technical description of the 'Visco-Beth' with pneumatic shaking gear together with a table giving dimensions and capacities available has been added. Also added is a description of the Cyclocell multitubular collector and the 'Visco-Handte' wet type dust collector. Particulars of unit dust collectors for grinding and polishing machines, etc., are included.—*The Visco Engineering Co. Ltd.*

★ ★ ★

A new single sheet leaflet, No. IN2, gives details of Icanite, a high duty iron for press tools.—*The Incandescent Heat Co. Ltd.*

'I.C.I. Rods and Sections' is the title of the latest publication of the Company's Metals Division. It contains details of applications, of technical data and production range, and the range available. Then explained are the various types of copper produced by the Company, various brasses and special alloys. The last part of the catalogue contains weight tables, equivalents for tensile and yield tests, and conversion factors.—*Imperial Chemical Industries Ltd.*

★ ★ ★

A publication based on a paper by Mr. P. Vessey, entitled 'Recent Production Data and Costs of Hydrogen over a Range of Pressures and Purities' has been brought out by P. G. Engineering Ltd.—*P. G. Engineering Ltd.*

★ ★ ★

'Gordon Products, Temperature Measurement' is the title of a new leaflet which describes the range of temperature measuring instruments suitable for power plant, industrial boilers of all types and sizes, heating and ventilating installations and other industrial purposes. The descriptions are brief in some cases, particularly as regards instruments which combine control mechanism with indicating and recording. Publications dealing more fully with such instruments are available.—*James Gordon and Co. Ltd.*

★ ★ ★

A new scrubber bulletin, No. LH203-D, has been published by Peabody Ltd., manufacturers of large industrial burners, and industrial air heaters. The bulletin gives details of the improved gas scrubber which is now fitted with an agglomerating slot stage. The bulletin is entitled 'Peabody High Efficiency Gas Scrubbers' and enumerates operating principles and the various types that may be obtained.—*Peabody Ltd.*

★ ★ ★

'The A.B.C. of "Electronic Brains"' is the name of a recently published booklet. It explains computers of various types, what each is capable of doing and how each operates. It is complete with illustrations, and ends by describing certain applications of computers and the future prospects of these machines.—*Elliott-Automation Ltd.*

★ ★ ★

A new publication from I.C.I. Metals Division entitled 'I.C.I. Titanium, Corrosion Resistance,' indicates the behaviour of titanium in the most commonly used aggressive media. There are tables in which the resistances of titanium are classified into three groups, to simple chemical reagents, industrial liquors, and liquid metals; the tables give the rating of the degree of corrosion relative to the concentration by weight and the temperature.—*Imperial Chemical Industries Ltd.*

★ ★ ★

Metallisation Ltd., has issued a leaflet entitled 'Heat Resistant Coatings by the Metal Spraying Process'. This leaflet describes the advantages of aluminium coatings which give protection of steel against oxidation up to 550°C., of aluminising which gives protection of iron and steel up to 950°C., and of nickel/chromium coatings which protect steel up to 1,200°C. Then some special modifications of the aluminising process are described.—*Metallisation Ltd.*

Fifty years of gas service to industry

THE WEST MIDLANDS BOARD CELEBRATES

THIS month the West Midlands Gas Board celebrates 50 years of gas service to industry—an achievement which, at the present stage of development, has already made the Board the proud possessors of the largest industrial load in the country—181½ mill. therms according to the last annual report and still rising.

Industrial gas really started in the Midlands in 1909, when Mr. C. M. Walter (later to become Dr. C. M. Walter) was employed by the City of Birmingham Gas Department to carry out experiments with gas burners under the direction of the then Chief Chemist of the undertaking, Mr. E. W. Smith (the late Sir Ernest Smith).

The Gas Committee of the City Council decided to lay a high-pressure gas main from Windsor Street gasworks to the centre of the city to provide a supply for overhead high pressure gas lighting. This main was commenced in 1910 and was extended in June of that year to Cornwall Buildings, where a high pressure laboratory had been installed. This laboratory was to be used for testing and for demonstration in connection with high pressure lighting. It was also decided to transfer Mr. Walter to this laboratory in order that he could carry out experiments on the use of this high pressure gas for industrial purposes, particularly in connection with blow pipes used by jewellers for various purposes.

Into the jewellery quarter

The Gas Committee decided to extend the high pressure main into the jewellery quarter, and this extension was effected over the next three years in various stages, the first stage to St. Paul's Square and Ludgate Hill being completed by January, 1912.

For the year ending March, 1911, the total sales of gas by the City of Birmingham Gas Department amounted to some 7,694 mill. cu.ft. Out of this amount the gas used for 'manufacture and motive power' amounted to 1,115 mill. cu.ft. and of this latter amount the gas used for industrial heating processes was approximately 385 mill. cu.ft., or slightly more than 5% of the total sales of the department, and in modern terms of measuring gas, this would be almost two million therms. The Gas Committee decided that the use of gas in industry had a promising future and in 1911 set up a separate section of the department under Mr. Walter, who was to have complete responsibility for servicing and developing the use of gas as a fuel for industrial processes.

Some early developments included high pressure gas blow pipes, jewellers swivelling 'side lights' and the 'Smith-Walter' duplex high-pressure gas burner for heating crucible melting furnaces.

A building was erected on the Windsor Street works to house melting equipment fired by both high-pressure and low-pressure gas, with space allowed for carrying out experiments for consumers on any industrial process application. This building became known as the 'high-pressure foundry' and was in effect the forerunner of the present day industrial gas development laboratory. Some of the early experiments carried out in 1911 in these premises included metal melting, sugar boiling, water heating, annealing of ferrous and non-ferrous components, and some of the early tests carried out on manufacturers' equipment covered governors, jets, venturies, etc. Gas-fired furnaces were installed on these premises for carrying out some of these tests and also to effect heat treatment of components for consumers intending to install similar equipment in their own works.

These furnaces were made by such historic names as Fletcher Russell, Richmond and John Wright, and were marketed as general heat treatment furnaces. Many companies in the city manufacturing armaments during the first world war found their own plant too small to cope with the demand for heat treatment of these armament components and these demonstrated furnaces were therefore put to work on production heat treatment of such items as tank track links, etc.

After the cessation of hostilities, a limited amount of commercial heat treatment was still carried out, as well as experiments into various heat treatment processes. In the early 1920's, for instance, gas carburising tests were carried out using coal gas enriched with ammonia, which was induced into a heated nickel chrome retort containing the components to be carburised.

During the 1914-18 war the use of gas for industrial heat processes expanded rapidly and what was at that time known as the 'furnace section' laid the foundation of the industrial consumer service. The man mainly responsible for this development was the late H. R. Hems.

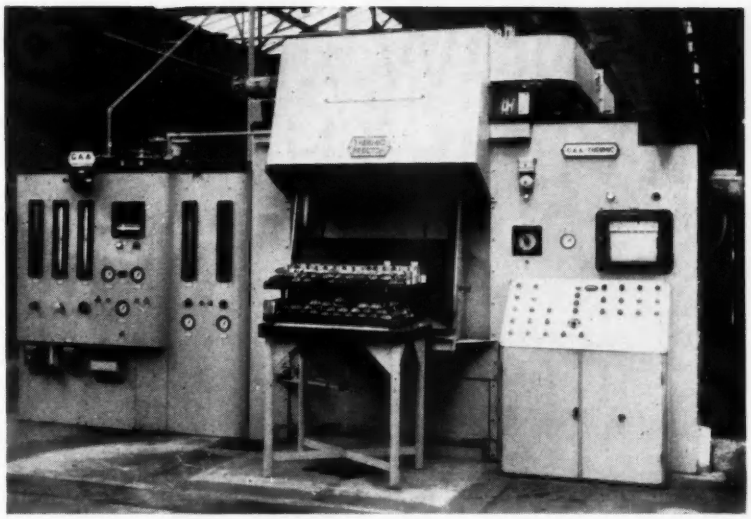
Because the Birmingham Gas Department was a municipal undertaking and the City of Birmingham the home of thousands of small trades, the Industrial Gas Department developed on what was probably unusual lines, expanding into the fields of metallurgical investigation, coupled with physical test of materials, following a direct appeal from local industrialists for such facilities to be made available.

First testing machine

The first tensile and compression testing machine was in fact installed in the physical test laboratory at the Council House, Margaret Street, in 1916. This meant that industrial gas really became a section of the industrial research laboratories of the City of Birmingham Gas Department and these laboratories became the Industrial Gas Development Centre of the Midlands when the country decided to get together on industrial gas matters.

Upon nationalisation of the gas industry, the Industrial Department Headquarters of the West Midlands Gas Board was formed by segregating the design and development side of the Birmingham industrial organisation.

Reorganisation was, of course, necessary and the Board



One of the modern, push-button operated, atmosphere-controlled furnaces, installed in the West Midlands Gas Board's Heat Treatment Department at Adderley Street, Birmingham.

decided to appoint Mr. Hems, who was by this time manager of the industrial department, City of Birmingham Gas Department, as the Industrial Gas Officer to the Board, with direct responsibility to the Board for industrial gas in the area. As the area had been split into divisions, each of which had complete autonomy on such matters as sales of gas, it was also decided to appoint divisional industrial gas officers in the first six divisions, with industrial gas being an additional responsibility for the Sales and Service Officer in the Shropshire Division.

An Industrial Department Headquarters was gradually built up at Brasshouse Passage, in Birmingham, under the direct control of the Board's Industrial Gas Officer, in order to afford centralised design, development and technical advice facilities to support the divisional officers in their efforts to maintain and increase the industrial gas load in the area.

The work carried out at Brasshouse Passage can be undertaken by requests from numerous sources:—

First, there is the direct appeal from a divisional officer for assistance on a particular project. This may be a request for assistance to carry out a survey on a works, tests on a particular piece of apparatus, the upgrading of the efficiency of a piece of plant, or the design of a special item of plant to serve the particular needs of the process to be carried out by the consumer.

Manufacturers' requests

Secondly, there is the request received from plant or apparatus manufacturers for assistance in the development of one of their items of plant, in collaboration with them to improve such points as quietness of operation of plant, safety in operation, the application of new or revised principles emanating from the research stations, or redesigning with a view to improving the appearance of the plant while retaining or increasing its efficiency.

Thirdly, there is the need for investigation into the type of plant used by a particular industry. In this instance the work is undertaken for the industry as a whole and any developments which prove to have commercial value are handed over to the recognised plant manufacturers for commercial exploitation.

An example of this latter type of development is the multi-passage kiln for pottery firing, which was developed by the Board up to its final prototype stage, and the design of which has now been taken up by kiln manufacturers. A number of these kilns have now been erected in pottery factories for the commercial firing of ware. Another example is the development of a bale-out metal melting pot designed to give quiet operation and unusually high comfort conditions for the operator. This latter item is at present undergoing its final tests in the laboratory.

A two-way traffic

Another function of Industrial Department headquarters is to maintain a high quality of technical service throughout the area by disseminating the most up-to-date information on all aspects of industrial gas usage to the industrial staffs within the area. This flow of information is, of course, a two-way traffic.

From the early work carried out during the first world war on commercial heat treatment of components in gas-fired furnaces at the old high pressure laboratory, Windsor Street, has grown a very extensive heat treatment service which the Board now offers to industry. This service is at present situated at Adderley Street, Birmingham and has a comprehensive range of furnaces capable of carrying out a wide variety of heat treatment processes.

This heat treatment service affords a training ground for junior members of the staff, enabling them to gain experience in the operation and control of gas-fired plant of this type. It enables the Industrial Department to assist manufacturers by processing experimental batches of their components in order to enable them to decide on the precise type of plant required to be installed in their own works; alternatively, it is possible to carry out production heat treatment for a manufacturer while he is reorganising his own heat treatment facilities. It is a shop window for industrial heat treatment furnaces and it carries out some very useful work on commercial heat treatment. Any experiments carried out are part of the free advisory service, although production heat treatment of components is, of course, carried out on a commercial basis and charged for at competitive prices.

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NEW WORLD 42

NEWS SUPPLEMENT

FIRST ORDERS FOR THE STRETFORD PLANT

A TOTAL of 65 enquiries and five orders have been received for Stretford process plant following the world-wide interest stimulated by this new liquid purification process (jointly developed by scientists of the North Western Gas Board and the Clayton Aniline Co. Ltd.).

Enquiries have come from America, Canada, Australia, France, Holland, Belgium, Switzerland, Denmark, Norway, Finland, Czechoslovakia, Germany, China and Japan.

As reported in the 'GAS JOURNAL' last week, R. & J. Dempster Ltd. are the first of the six chemical engineering firms licensed to exploit the process to secure an order from abroad. (The other licensees are W. C. Holmes & Co. Ltd., Newton Chambers & Co. Ltd., Simon-Carves Ltd., Humphreys & Glasgow Ltd. and Woodall-Duckham Construction Co. Ltd.).

In competition with German, French and Belgian firms Dempsters are to build the Stretford plant in Antwerp. It will have a throughput of 10.7 mill. cu.ft. of refinery gas and will be ready in December 1961.

Three orders for installations in this country have been received by W. C. Holmes & Co. Ltd. For the South Western Gas Board an existing Manchester plant is to be converted, and two firms outside the gas industry, Courtaulds Ltd., and the Midland Tar Distillers, are to have new plant.

Humphreys & Glasgow have received one order, from Transparent Paper Ltd., who are to use the Stretford process for an experimental period.

Brazil's l.p.g. imports

Brazil's imports of liquefied petroleum gases in the first nine months of 1960 totalled U.S. $9 mill. (.9% of total imports), as against U.S. $5.4 mill. (.5%) in the same period of 1959.

GAS COUNCIL CHIEFS SEE NATURAL GAS FIELD IN ALGERIA

THE Chairman and Deputy Chairman of the Gas Council, Sir Henry Jones and Mr. W. K. Hutchison respectively, with Mr. Michael Milne-Watson, Chairman of the North Thames Gas Board, and representatives of Conch International Methane Ltd., have been visiting Algeria to see the natural gas field at Hassi R'Mel.

They were expected back in London on Tuesday, says a statement from a Gas Council spokesman.

The purpose of their journey was to obtain information required under the scheme for the importation of liquid natural gas to the U.K., which the Gas Council hopes soon to be submitting to the Minister of Power.

Negotiations relating to the terms on which gas would be supplied are still in progress.

FIRST TANKER

A refrigerated l.p.g. tanker is being built in Japan by Mitsubishi Nippon Heavy Industries (Yokohama) Ltd., for the Bridgestone Liquefied Petroleum Gas Co. Ltd., of Tokyo. This vessel will be the first large-scale commercial ship to carry l.p.g. at essentially atmospheric pressure and is scheduled for completion early in 1962.

The vessel will have a capacity of 180,000 barrels, equivalent to about 17,000 tons of refrigerated l.p.g. at approximately −40°F., and a service speed of 16 knots.

The tanker has been designed by Conch International Methane Ltd. for the owners and the special low temperature features are based on Conch patents under a licence agreement with Bridgestone Liquefied Petroleum Gas Company, which was validated by the Japanese Government in May, 1960.

METHANE PIONEER

The world's first liquid methane carrier, the Methane Pioneer, which made seven completely successful deliveries from the U.S. Gulf Coast to Canvey Island, Essex, was designed and developed by Conch, and the Bridgestone tanker will incorporate much of the know-how and experience gained on this vessel.

Supplies of refrigerated l.p.g. are being obtained from Kuwait, and in Japan the l.p.g. will be distributed by Bridgestone for industrial and domestic use as bottled gas.

In January, 1960, the formation of Conch International Methane Ltd. was announced. Canadian Shell (a company of the Royal Dutch/Shell Group), Continental Oil and Union Stock Yard and Transit Company of Chicago are shareholders.

YORKSHIRE PIT STRIKE HAS EASED

THE number of pits involved in the strike of Yorkshire miners has fallen drastically and at the time of going to press only 16 were still affected, against 59 on Saturday.

On the two day shifts the number of men involved dropped from 42,000 last week to under 16,000 on Monday.

The situation on the night shift was not clear.

It was apparent on Tuesday that the strike was almost localised in the Doncaster region, where its leadership was based.

Of the 16 pits still out 11 were in the Doncaster area. Of the rest, three were in the Rotherham area and one in the Carlton region.

The remaining pit, the Water Haigh colliery, at Castleford, held a ballot on Monday, says the *Financial Times*, and voted overwhelmingly for a return to work.

The tonnage lost since the strike began had reached 659,000 by Tuesday.

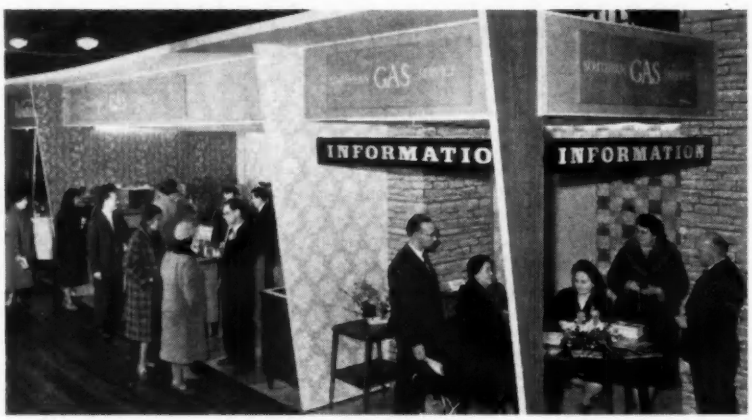
U.S. FLIERS WILL BURN UP THE GAS

AN estate of 113 houses, now being completed at Chicksands air base, near Hitchin, Watford Division, Eastern Gas Board, will accommodate U.S.A.F. personnel and their families. They are expected to be appreciable gas consumers.

The houses will give comfortable open-plan living, with central heating by a powerful warm air unit.

Each house will be equipped with a Waterbury Hiboy warm air heater of between 44,000 and 52,000 B.t.u. output, and a Flavel Envoy cooker. The total annual consumption for each house is expected to be 1,860 therms.

SOUTHSEA CATERING EXHIBITION



Some of the large number of hoteliers and caterers who visited the Southern Gas Board's Catering Exhibition held at the South Parade Pier, Southsea. The Exhibition was one of the five special Catering Exhibitions which have been held or are to be held in all the main centres of the Southern Gas Board's Area.

Electricity will cost more in London area

DOMESTIC consumers of electricity in the County of London and parts of Surrey, Kent, Essex and Middlesex will have to pay between 1½d. and 6d. a week more for this form of fuel. The London Electricity Board made the announcement last week.

The Board states that the increases are necessary because of a rise in the cost of buying electricity in bulk from the Central Generating Board, as well as increases in wages and salaries, interest payments, and local authority rates.

The tariff revisions, which will come into force following meter readings taken after March 31, include an increase from 1½d. to 1⅞d. in the unit charge of domestic and other two-part rates, and increases in certain flat rates—other than the flat rate for lighting.

There is no change in the rates for restricted hour off-peak supplies.

NEW TARIFF

In addition, says *The Guardian*, the Board announces the introduction of a standard tariff for industrial supplies which will replace all existing industrial tariffs and complete the standardisation of electricity tariffs in the area.

The Board states that increased costs had worsened its prospects for 1961-62 by about £3 millions—or 1s. in the pound of revenue.

To 'keep out of the red,' a rise in retail charges was inescapable. During the last 12 years the average price per unit sold by the Board has increased by only 22%.

An 'International Fortnight' began last year in Chester, is this year to be extended to other shops including the gas showrooms.

RHEOSTATIC'S MIDLANDS HEADQUARTERS

LICHFIELD HOUSE, a recently-built block of shops and offices at 38 Smallbrook, on the Birmingham Ringway, is to be the new Midlands Headquarters of The Rheostatic Co. Ltd., a member of the Elliott-Automation Group, under Mr. J. S. Smith, the Company's Midland Area Manager.

With the increased accommodation for staff, the Company is now able to provide, throughout the Midlands, comprehensive technical sales and after sales service for the complete range of Satchwell controls and heating systems.

The Rheostatic Company will also be representing Black Automatic Controls Ltd., another of the Elliott-Automation companies, in the Midlands, selling its range of solenoid operated valves, pressure and flow switches to the heating, ventilating and air conditioning industries.

DIVIDENDS

Interim dividends have been declared by Colonial Gas Holdings Ltd., Melbourne, Australia, as follows: Preferred stock, 3%; Ordinary stock, 4%.

N.C.B. chairman plans major development

AT the Ninth Annual Dinner of the Institution of Plant Engineers Mr. Alfred Robens, Chairman National Coal Board, said that by 1965, 80% of the coal produced from British mines would be from pits that were either brand new or had been completely reconstructed.

In April it was proposed to launch the largest sales campaign in the history of the mining industry, and the Board's technical service would be expanded with a view to ensuring that the plant user was getting the right kind of coal for his particular purpose.

To this object more attention to the blending of coals was necessary.

Within the next year or two, output was expected to rise from 180 mill. tons to 200 mill. tons, and arrangements were being made for 140 mill. tons of this increased output to be blended.

600 GROUP DECLARES DIVIDENDS

THE Directors of the George Cohen 600 Group Ltd., have declared an Interim Dividend of 4½% actual, less tax, on the £3,125 mill. Old Ordinary stock of the Company, payable on March 31, 1961, in respect of the financial year ending on that date.

The Directors have also resolved that the half-yearly dividend due on March 31,1961, on the £1,500 mill. 4½% Cumulative Preference stock of the Company be paid at the rate of 4½% per annum, less tax.

The half-yearly dividend due on March 31, 1961, on the £1 mill. 6½% Second Cumulative Preference stock of the Company will be paid at the rate of 6½% per annum, less tax.

Scarborough crematorium uses gas

Scarborough Corporation has spent more than £59,000 on a new crematorium. Work on the crematorium, which is built on a 4½-acre site next to the Woodland Cemetery, was started in June, 1959. Two cremators have been installed and they are fired by gas supplied by the North Eastern Gas Board.

PERSONAL NOTES

MR. C. E. MILLS has been appointed Chief Engineer and Production Controller to the East Midlands Gas Board in succession to MR. F. G. PYPER who died recently. Mr. Mills was previously assistant chief engineer and production controller working at the department's operational headquarters at Litchurch Works, Derby. MR. A. W. ELLIOTT, previously production engineer (Southern), has been appointed Assistant Chief Engineer (Production). MR. W. QUICK, previously mechanical engineer at Litchurch, has been appointed Assistant Chief Engineer (Construction). MR. G. H. POTTER, production engineer (Northern) has transferred to Production Engineer (Southern), and MR. J. BATEMAN, who was engineer at Carhouse Works, Rotherham, has been appointed Production Engineer (Northern).

DR. W. D. SCOTT has been appointed Chairman, MR. C. G. ERLAM Managing Director and MR. J. J. MOLINS Assistant Managing Director of Microcel Ltd. Dr. Scott has been appointed Chairman and DR. G. ADER Managing Director of Artrite Resins Ltd. Mr. Erlam has been appointed Chairman, MR. P. L. WATSON and MR. J. A. HEMINGWAY Directors of Palmer Aero Products Ltd. Dr. Scott has been appointed Chairman and MR. D. J. HODGSON Managing Director of Glass Yarns and Deeside Fabrics Ltd. These Companies are subsidiaries of B.T.R. Industries Ltd.

MR. T. MERVYN JONES, Chairman, Wales Gas Board, who was awarded a C.B.E., in the New Year Honours List, attended the Investiture with his wife and his mother. Mr. Mervyn Jones has now flown to New York to take part in a tour of the U.S.A. as a guest of the American State Department under the Foreign Leader Programme.

MR. W. J. WITHERS has been appointed Administrative Assistant to the Commercial Manager of the North Thames Gas Board. MR. A. W. A. TOMLIN has been appointed an Assistant to the Commercial Manager, and MR. V. S. A. FOLKES has been appointed Labour Officer, Northern Division.

COMING EVENTS

March 15. — I.G.E., SOUTH WESTERN SECTION: Grand Atlantic Hotel, Beach Road, Weston-super-Mare. Visit to Weston-super-Mare Manufacturing Station in morning, General Meeting in afternoon. 11 a.m.

March 16.—I.G.E., NORTH OF ENGLAND SECTION: Distribution Centre, Northern Gas Board, Tyneside Division, Market Street, Newcastle-on-Tyne. Joint Meeting with Northern Junior Gas Association. 'Coal—An Assessment,' by Dr. A. C. Monkhouse. 2.30 p.m.

April 7.—WALES G.C.C.: County Hall, Llandrindod Wells. 11 a.m.

Isle of Man chairman hints at plant plans

A RENEWAL and replacement of plant 'is most certain in the near future,' Mr. W. S. Waid, Chairman, said in his statement to the shareholders at the 126th annual meeting of the Douglas Gas Light Co. Ltd., Isle of Man. He reported a satisfactory year's working.

He regretted that the price of coal—their principal raw material—again showed an increase, as also did the handling and freight charges.

The reserve fund stood at £46,218, raised during the year by £735 investment interest. The special purposes fund remained unchanged at £17,699, and the renewals fund totalled £28,560.

He emphasised the importance of these funds for future and inevitable replacements.

Land, buildings, etc., stood at £160,372, practically the same as last year, and the reserve fund investments were raised to £39,603, or by about £7,000, representing further purchases of securities.

Unfortunately, the market value of their total holding showed a depreciation of about £6,000 due to the present weakness of gilt-edged stocks.

Current assets stood at £56,115, being a reduction of about £4,600, and the total assets at £256,090 showed an increase of £2,400.

Compared with the previous year cash received from the sale of gas, and residual products, showed a decline of £2,700 at £164,105.

Receipts from gas sales increased, but those from coke were less due to decreased quantity made and sold.

Relatively, the more serious fall was in receipts from tar, demand being much below normal.

On the debit side of the profit and loss account the cost of raw materials and renewals was increased by about £1,200 to £129,429. Outlay on cost of coal was, in fact, less than in the previous year, but only due to the smaller tonnage carbonised.

'I regret to record that the price per ton into works again showed an increase not only in the price of the commodity but also in freight and handling charges.

'There would appear to be no end to this vicious spiral of increases.'

The profit for the year was £10,600, down by £363 on 1959. Adding the balance of £8,263 brought in and an overprovision of £56 for income tax, the total was £18,919.

The meeting approved payment of an interim dividend of 7d. per share in September and of a final dividend of 9.8d. per share, payable on March 6.

Radiation makes more changes

RADIATION LTD., one of Europe's largest domestic appliance groups, which includes New World, Bratt Colbran, Ascot, Jackson, Parnall and Parkray, has announced changes in connection with two of its subsidiary companies.

These follow a number of changes announced during January, as part of the Group's policy of consolidation and co-ordination.

In this case, the change in name of the subsidiary companies is intended mainly to achieve a closer identification of the names of two trade subsidiaries with the brand names of the principal products which they handle.

The name of Radiation Group Sales Ltd., the company which markets New World gas appliances for the home market, has been changed to Radiation New World Ltd.

Directors of the new company will be MR. W. D. KING (Chairman of the parent company—Radiation Ltd.); MR. F. P. S. STAMMERS (Managing Director of the parent company); MR. A. J. PARKER, MR. S. L. PLEASANCE and MR. S. J. STANBROOK (Directors of the parent company).

MR. C. T. BAKER-CARR will be a Director and the General Sales Manager of Radiation New World Ltd.

Fletcher, Russell & Co. Ltd., has changed its name to Radiation Catering Equipment Ltd.

This company has incorporated the previous activities of Radiation (Large Cooking Equipment) Ltd., which has ceased to operate.

The new company will continue to design, manufacture and sell an increasingly wide range of Radiation catering equipment for all types of fuel.

The Board of Radiation Catering Equipment Ltd. will be: MR. W. D. KING; MR. F. P. S. STAMMERS (Managing Director of the new company); MR. A. J. PARKER, MR. S. L. PLEASANCE and MR. S. J. STANBROOK (Directors of the parent company).

MR. A. O. RUSSELL will be a Director and the General Sales Manager of the company.

Joint meeting

THE joint meeting of the Institution of Chemical Engineers and the Institution of Gas Engineers on 'Some factors in the safe operation of air separation plant,' will now take place on Wednesday, March 22, 1961.

The meeting will be held at the Royal Institution, Albermarle Street, London, W.1, and will start at 2.30 p.m. The discussion will be opened by Dr. J. B. Gardner.

This meeting had previously been arranged for Tuesday, March 21, 1961.

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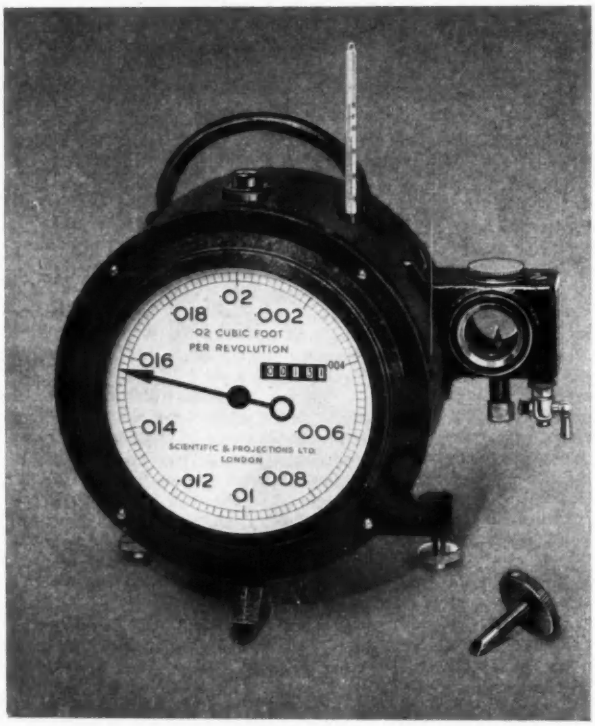

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